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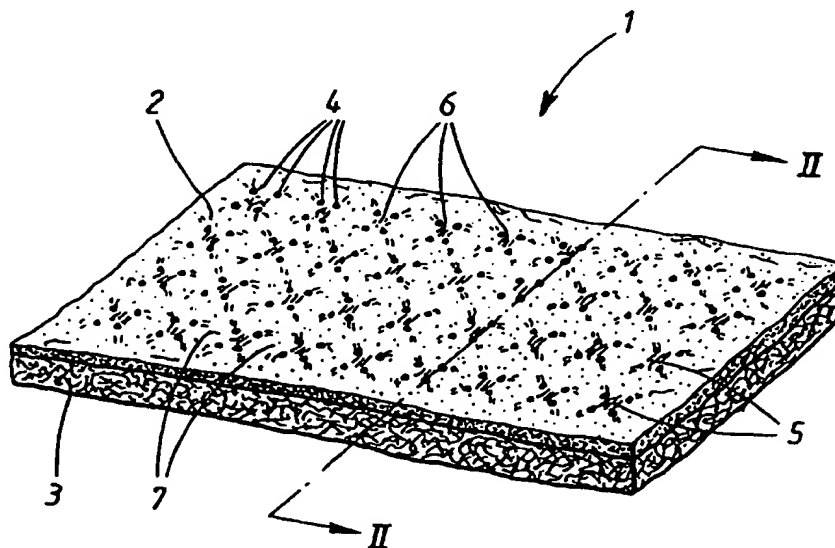
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## (57) Abstract

An absorbent article, such as a diaper, sanitary napkin, incontinence protector, wound dressing or the like, comprising an absorbent body (12) enclosed between a liquid-impermeable backing sheet (11) and a laminate (1) in the form of a liquid-permeable top sheet (2) and a liquid-permeable liquid transfer sheet (3), with the liquid transfer sheet (3) lying proximal to the absorbent body (12), in which article the liquid-permeable top sheet (2) and the liquid transfer sheet (3) are joined together and in which the absorbent body includes partially neutralised superabsorbent material.

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AN ABSORBENT ARTICLE HAVING A MATERIAL LAMINATE THAT  
COMPRISES A LIQUID PERMEABLE TOP SHEET AND A LIQUID PERMEABLE  
LIQUID TRANSFER SHEET

5 The present invention relates to an absorbent article that  
comprises an absorbent body enclosed between a liquid  
impermeable backing sheet and a material laminate in the form  
of a liquid permeable outer sheet or top sheet and a liquid  
permeable liquid transfer sheet, with the liquid permeable  
10 transfer sheet lying proximal to the absorbent body.

**BACKGROUND**

15 A common problem encountered with the absorbent articles such  
as diapers, sanitary napkins, incontinence protectors and the  
like is that their use can lead to undesired side effects,  
such as skin irritation and problems associated with body  
waste odours. These problems can arise as a result of  
occlusion, the presence of moisture, and of mechanical,  
20 microbial and enzymatic factors, all of which coact mutually  
to different extents and amplify the effect of one another.  
Several undesired side effects can also arise as a result of  
or in conjunction with an increase in pH.

25 U.S. 3,794,034 describes the significance of pH in an  
absorbent article and teaches impregnation of the article  
with buffering substances that enable the pH in the article  
to be kept between 3.5 and 6.0, which is beneficial with  
respect to both inhibiting the growth of undesired bacteria  
30 and therewith the occurrence of undesired odours, and also in  
avoiding a negative effect on the wearer's skin.

Swedish Patent Application SE 9702298-2 teaches the use of an  
absorbent article that includes a pH-regulating substance in  
35 the form of a partially neutralised superabsorbent material  
where, after wetting, the pH in the article will lie between

3.5 and 4.9. An absorbent article according to SE 9702298-2 reduces the risk of skin irritation and also problems associated with bad odours. A conventional superabsorbent material has a degree of neutralisation of about 70%, whereas the partially neutralised superabsorbent material has a lower degree of neutralisation.

#### SUMMARY OF THE INVENTION

The object of the present invention is to reduce the risk of skin irritation still further, such as contact dermatitis for instance. This is achieved with an absorbent article that includes an absorbent body which comprises partially neutralised superabsorbent material, and a liquid-permeable fibrous top sheet which is bonded thermally to a porous liquid transfer sheet at discrete regions (e.g. punctiform/linear regions).

The invention thus relates to absorbent articles, such as diapers, sanitary napkins, incontinence protectors, wound dressings and the like, that comprises an absorbent body which is enclosed between a liquid-impermeable backing sheet and a material laminate comprised of a liquid-permeable, fibrous material sheet as a top sheet, and a liquid-permeable, porous and resilient material sheet as a liquid transfer sheet which lies proximal to the absorbent body, wherein the material laminate has a planar extension and a thickness direction perpendicular to the planar extension, wherein at least one of the material sheets comprises thermoplastic material, and wherein the two sheets of material are joined together through the medium of laminate bonding locations within which the thermoplastic material is caused to soften at least partially or to melt and therewith bind the two sheets together, and wherein the absorbent body includes partially neutralised superabsorbent, and wherein the sheet-joining regions or locations on the laminate extend

in the thickness direction of the laminate through the top sheet and at least through a part of the liquid transfer sheet.

5 Plastic film is used as the top sheet in many types of  
absorbent articles. The benefit afforded by a fibre structure  
is that it reduces the risk of occlusion, which, in turn,  
reduces the risk of skin irritation. This is because a fibre  
structure is not as dense as film. A fibrous top sheet also  
10 presents a normally softer and smoother surface to the skin,  
therewith reducing the mechanical effect of the top sheet  
against the skin (e.g. chafing of the skin as the wearer  
moves).

15 The benefit afforded by a porous liquid acquisition layer or  
sheet between the liquid-permeable top sheet and the  
absorbent body, which is thermally bonded to the top sheet in  
discrete regions, is that the airiness of the fibrous outer  
sheet is retained to a better effect than when the whole  
20 surface of the top sheet or at least a large part of the  
surface thereof, is bonded to the surface of the liquid  
acquisition sheet. The discrete bonds also normally provide  
in the thickness direction of the laminate, a denser structure  
than in the non-bonded parts, which enables liquid to be  
25 guided more easily at the bond locations towards the inwardly  
lying porous liquid-acquisition structure.

Because the absorbent body includes partially neutralised  
superabsorbent material the pH will be lowered when said body  
30 is used, therewith counteracting undesired secondary effects,  
such as bad odours and skin irritation. This has a very good  
effect on the wearer in combination with the drier and softer  
top or outer sheet that faces the wearer in use. A typical  
degree of neutralisation is about 70%, although the degree of  
35 neutralisation will be lower in the case of the present  
invention.

The invention is particularly suitable for use in the prevention of diaper rash, among other things.

5  
BRIEF DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail with reference to the Figures of the accompanying drawings, in which

10 Fig. 1 illustrates from above a laminate included in an absorbent article according to the invention;

15 Fig. 2 is a sectional view through the laminate of Fig. 1, taken on the line II-II in said Figure;

Fig. 3 illustrates a first bonding pattern;

Fig. 4 illustrates a second bonding pattern;

20 Fig. 5 illustrates a third bonding pattern;

Fig. 6 illustrates a fourth bonding pattern;

25 Fig. 7 illustrates a fifth bonding pattern;

Fig. 8 illustrates a first embodiment of the invention in the form of an incontinence protector;

30 Fig. 9 is a diagrammatic illustration of the production of ammonia in a reference product as compared with a reference product 4; and

35 Fig. 10 is a diagrammatic illustration of the skin surface pH when using a test product that includes a conventional

absorbent body as compared with the use of a corresponding test product 4.

## DESCRIPTION OF EMBODIMENTS

5 The invention relates to absorbent articles, such as diapers, sanitary napkins, incontinence protectors, wound dressings and the like. Fig. 8 shows by way of example an incontinence protector that includes an absorbent body or pad 12 enclosed  
10 between a liquid-impermeable backing sheet 11 and a material laminate 1 that comprises a liquid-permeable fibrous material sheet 2 as a top sheet, and a liquid-permeable porous, resilient material sheet 3 as a liquid transfer sheet 3. The liquid transfer sheet 3 faces towards the absorbent body 12  
15 and the material laminate 1 has a planar extension and a thickness direction perpendicular to said planar extension. At least one of the material sheets 2, 3 includes thermoplastic material and the two sheets 2, 3 are bonded together through the medium of bonding regions 4 on the  
20 laminate 1, wherewith the thermoplastic material in said regions is caused to soften at least partially or to melt and thereby bond together the two sheets of material 2, 3. The absorbent body includes partially neutralised superabsorbent. The laminate bonding regions extend in the thickness  
25 direction of the laminate 1 through the top sheet 2 and at least partially through the liquid transfer sheet 3.

The bonding regions on the laminate 1 are disposed in two or more groups 5, with at least two bonding locations 4 in each  
30 group 5, wherewith the greatest distance between two mutually adjacent bonding locations 4 in a given group is shorter than the shortest distance between each group 5 and its nearest neighbouring group 5, said laminate 1 thereby having between the bonding locations 4 in each bonding group 5 bond-free  
35 regions 6 that have a higher density than those bond-free

regions 9 in the laminate that are situated between said bonding groups 5.

5 The laminate is described in more detail with reference to Figs. 1-7. The laminate 1 illustrated in Figs. 1 and 2 includes a first material sheet 2, the top sheet 2, and a second material sheet 3, the liquid transfer sheet 3. The first material sheet 2 is conveniently comprised of a relatively thin nonwoven material.

10 Nonwoven material can be produced in many ways, for instance by carding or spinning a fibrous mat and then bonding the mat. A melt-blow technique can be used to deposit short fibres in the form of a fibre mat. The fibres in nonwoven material can be bonded in any one of a number of different ways. For instance, different types of binder can be used. Furthermore, hot-melt components present in the material can be used to effect bonding by ultrasound or by applying heat. Other bonding methods are needling and hydro-entangling. A combination of different bonding methods may also be used.

15 When the laminate is used as a liquid-permeable top material on an absorbent article, the first material sheet 2, the top sheet 2, is the sheet which is intended to lie proximal to the wearer of the article. It is therewith important that the first sheet has a smooth and soft surface against the wearer.

25 The second material sheet 3, the liquid transfer sheet 3, will preferably be thicker than the first material sheet 2, and is comprised of a porous, resilient fibre material having a thickness of from 0.5 to 4 mm. This second material sheet 3 serves as a liquid transfer sheet when the laminate is mounted on an absorbent article as a top sheet. The second material sheet 3 will therefore preferably be able to accommodate large volumes of liquid in a short space of time and to spread or disperse liquid in the plane of said

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material sheet, pass the liquid to an absorbent body disposed beneath the laminate 1, and also be able to store temporarily liquid that has not had time to be absorbed by the absorbent body. Materials that are particularly suitable for use in the liquid transfer sheet 3 are synthetic fibre wadding, carded bonded or non-bonded fibre layers, or bulky nonwoven material. One particular type of fibre material that can be used in this context is tow, by which is meant essentially parallel, long or infinite fibres or fibre filaments which exist in the form of layers or strings. Another suitable material in this context is porous hydrophilic foam material. The second material sheet may also consist of two or more layers of different material or of one and the same type of material.

By way of a non-limiting example of a laminate that forms the top sheet of an inventive absorbent article can be mentioned a composite nonwoven material comprised of a first material sheet 2 of nonwoven synthetic fibre material that has a weight per unit area of between 10 and 50 g/m<sup>2</sup>, and a second material sheet 3 comprised of synthetic fibre wadding and having a weight per unit area of between 20 and 100 g/m<sup>2</sup>. At least the first sheet 2, and preferably both sheets 2, 3, will include thermoplastic material. Suitable thermoplastic material is polyester, such as polyethylene and polypropylene, and polyamides, polyester and the like. Other types of bicomponent fibres may be used.

The two sheets 2, 3 are joined together through a large number of bonding locations 4. The bonding locations 4 are essentially punctiform and have been formed by compressing the laminate 1 and supplying energy thereto simultaneously. The thermoplastic material has therewith been softened or melted at the bonding locations 4 such as to bond together the two sheets 2, 3 of the laminate 1. The first and the second sheets 2, 3 are suitably bonded together by thermal

bonds or by ultrasound bonding in the form of welding, for instance. The welding pattern formed herewith has a three-dimensional structure.

5 The bonding locations 4 are disposed in groups 5 with four  
10 bonding locations 4 in each group 5. The four bonds are placed so as to form the corners of a square. The distance between the bonding locations 4 in each group is shorter than the distance between adjacent groups 5. The distance between the bonding locations within the groups 5 themselves is determined as the nearest distance between mutually adjacent bonding locations 4. Correspondingly, the distance between the groups 5 is determined as the nearest distance between mutually adjacent groups 5. The distances are measured from the edges of the bonding locations 4 in both cases. The shortest distance  $x$  between adjacent groups, measured between the bonding locations 4 closest together in respective groups 5, is suitably 2-6 mm, and the greatest distance  $y$  between mutually adjacent binding locations 4 in the groups is 15 suitably 0.5-1 mm. The first-mentioned distance  $x$  is therewith at least roughly twice as large as the last-mentioned distance  $y$ . The  $x/y$  ratio between the distances  $x$  and  $y$  is from 2/1 to 12/1.

25 As the molten or softened thermoplastic material in the laminate 1 cools, it will solidify and function as a laminate bonding agent. In addition to this bonding of the two sheet 2, 3, the porous structure in the sheets 2, 3 remains compact or dense. Most pronounced is the densification at the actual  
30 bonding locations 4. The particular positioning of the bonding locations 4 means that the bonded laminate 1 will exhibit square areas 6 that are bordered by the bonding locations 4 in the groups 5, and will be denser in these regions than in the regions 7 between the groups 5.

The sheets forming the laminate 1 shown in Figs. 1 and 2 are bonded together by forming through-penetrating holes 8 in the top sheet 2 at the bonding locations 4. In addition, the material situated within and nearest to the bonding locations 4 is greatly densified and has finer capillaries than the surrounding material. This enhances the ability of the regions in which the bonds are located to allow liquid to pass from the top sheet 2 to the liquid transfer sheet 3.

Although the laminate 1 is shown to include through-penetrating holes 8 in the first sheet 2, the top sheet 2, it will be understood that this is not a necessary feature of the invention. Thus, the invention also includes laminates in which the bonding locations 4 exhibit a surface of a more or less liquid-impermeable nature, and a laminate that includes both through-penetrating holes and liquid-impermeable bonds. Bonding locations of low liquid permeability or liquid impermeability are obtained, for instance, when the laminate includes a high proportion of thermoplastic material which is melted and then allowed to solidify into a film-like surface. Although the actual bonding locations 4 are practically totally impervious to liquid, the compacted fibre structure created around the bonding locations 4 in conjunction with the bonding compression that takes place nearest each bonding location 4 still has a very high liquid transfer capacity.

Furthermore, the densified regions 6 inwardly of the bonding locations 4 in each group 5 of bonding locations form zones of elevated liquid transfer capacity. Because the distance between the bonding locations 4 in each group 5 is relatively small, preferably from 0.5 mm to 1 mm, compression of the material in the bonding locations 4 will also affect the area 6 inwardly of said bonding locations 4 such as to obtain a denser structure. Thus, the size of the capillaries in the densified region 6 delimited by the bonding locations 4 is, on average, smaller than the size of the capillaries in those

regions of the laminate 1 that are located between the groups 5 of bonding locations 4. The laminate 1 will thus have a relatively high liquid transfer capacity in relation to the combined surface area of the bonding locations 4. The combined bonded surface area will preferably be from 3 to 11% of the total surface area. The surprisingly good liquid transport and liquid transfer capacity of the laminate is not due solely to the bonding locations 4 themselves and to the regions or areas situated immediately adjacent these locations and exhibiting an elevated liquid transfer capacity, but is also due to those areas or regions located between the bonding locations 4 in a group 5 which also contribute to the improved liquid transfer capacity.

The invention thus enables regions of greater density, and therewith enhanced liquid transport capacity, to be created while still obtaining a high bulk laminate 1 which is soft and pliable. This results in a drier surface against the wearer's skin and in a product that has a lower pH, due to the absorbent body including partially neutralised superabsorbent. The risk of undesired side effects, such as bad odours and skin irritation, is also reduced.

All use of products that are applied to skin can lead to undesired side effects. These side effects can be caused by occlusion, the presence of moisture, and factors of a mechanical, a microbial and an enzymatic nature. Such use can also cause skin irritation, primary or secondary skin infections and generate undesirable odours. An increase in pH is a normal occurrence when absorbent products are worn against the skin. However, several undesired side effects can occur as a result of or in conjunction with an increase in pH. Irritative contact dermatitis, which is shown to have a relationship with a surface pH of the skin, is one example of such undesired side effects.

Another example of undesired side effects is that certain bacteria, such as *Proteus*, are able to metabolise the substances in urine and other body fluids and give rise to odorous substances, such as ammonia and amines, which also cause an increase in pH. At high pH values, the equilibrium of many odorous substances is displaced so as to generate more volatile components and are therefore more malodorous than at low pH values.

An environment such as that found in an absorbent article in which moisture, nutrients and heat, among other things, are available also favours the growth of microorganisms. High bacteria numbers constitute an infection risk. A high bacterial presence also means a greater risk that embarrassing odours will be produced by the different substances that form as a result of the biological or chemical degradation of body fluid constituents, such as the constituents of urine and menstrual fluid. The activity of micro-organisms is greatly dependent on pH and decreases with falling pH values.

The use of a partially neutralised superabsorbent material in the absorbent structure according to the invention results in a decrease in pH. The aforesaid undesired side effects are thus reduced in the case of an inventive absorbent structure.

Partially neutralised superabsorbent material is used in absorbent articles described in Swedish Patent Application SE 9702298-2. A reduced pH value is obtained as a result of including in the material a pH-controlling substance in the form of a partially neutralised superabsorbent material. It has been found that a pronounced growth-inhibiting effect is obtained with respect to undesired strains of micro-organisms and the occurrence of undesired side effects that can result from the use of the article is reduced, when the pH of the

absorbent article lies in the range of 3.5-4.9 or preferably 4.1-4.7 after wetting of the article.

A suitable, partially neutralised superabsorbent material may be comprised of a cross-linked polyacrylate of the kind described in European Patent Specification EP 0 391 108, Casella AG. Superabsorbent materials other than the aforesaid material that have corresponding properties may alternatively be used.

Examples of relationships between degrees of neutralisation and pH values of the superabsorbent material will be evident from the following text. The information listed below has been taken from Swedish Patent Application SE 9702298-2.

Degree of neutralisation %	pH
18	4.0
25	4.3
30	4.5
35	4.7
45	5.0
60	5.5

It will be evident from the table that the degree of neutralisation should normally be lower than 45% and preferably lower than 35%. The degree of neutralisation, however, should preferably be higher than about 20%. These degrees of neutralisation are also appropriate with respect to the present invention.

At those degrees of neutralisation used in the absorbent structure of an absorbent article in accordance with the invention, there is obtained an acid environment after the structure has been wetted when worn against the skin,

therewith inhibiting the growth of micro-organisms and avoiding offensive odours and skin irritation.

After being wetted, the absorbent body of the inventive absorbent article will have a pH in the range of 3.5-4.9, preferably in the range of 4.1-4.7.

Another benefit afforded by the invention is that the occurrence, e.g., of offensive odours and skin complaints as a result of wearing the absorbent article against the skin are avoided. The growth-inhibiting effect is based on the fact that many micro-organisms have an activity which is strongly pH-dependent and decreases with decreasing pH values. Enzymes such as lipases and proteases also have an activity which is strongly pH-dependent and which decreases with decreasing pH values. Thus, a reduction in pH results in a reduction in the activity of the majority of micro-organisms and also in a reduction in enzyme activity, therewith providing a reduction in negative skin affects.

The following examples have been taken from SE 9702298-2 to illustrate the effect of absorbent articles that have an absorbent body which includes a partially neutralised superabsorbent material. The absorbent body also includes a cellulose pulp having a pH of 2.5-8.5.

An absorbent body that contains absorbent material and absorbed liquid is by nature a heterogeneous system from a pH aspect. The system may include superabsorbent material, fibres, and liquid that contains several types of ions. In order to obtain reproducible pH values, it is necessary to take measurements at several places in the sample body and to calculate the mean value of such measurements.

## DESCRIPTION OF EXAMPLES:

The following examples are intended to illustrate more closely the effect in absorbent articles that have an absorbent body which includes a combination of partially neutralised superabsorbent material and cellulose pulp having a pH of 2.5-8.5. Comparisons are made with conventional material of a corresponding type.

## 10 TEST LIQUIDS:

Test liquid 1

0.9% sodium chloride solution

Test liquid 2

Synthetic urine according to the description of, *inter alia*, EP 0 565 606, such urine being obtainable from Jayco Pharmaceuticals Co., Pennsylvania. The urine has a composition of 2 g/l KCl; 2 g/l Na<sub>2</sub>SO<sub>4</sub>; 0.85 g/l (NH<sub>4</sub>)H<sub>2</sub>PO<sub>4</sub>; 0.15 g/l (NH<sub>4</sub>)<sub>2</sub>HPO<sub>4</sub>; 0.19 g/l CaCl<sub>2</sub> and 0.23 g/l MgCl<sub>2</sub>. This mixture has a pH of 6.0-6.4.

Test liquid 3

Synthetic urine containing the following substances: KCl, NaCl, MgSO<sub>4</sub>, KH<sub>2</sub>PO<sub>4</sub>, Na<sub>2</sub>HPO<sub>4</sub>, NH<sub>2</sub>CONH<sub>2</sub>. This mixture has a pH of 6.0-6.5.

Test liquid 4

Sterile synthetic urine to which a micro-organism growth medium has been added. The synthetic urine includes monovalent and divalent cations and anions and urea and was prepared in accordance with instructions given in Geigy,

Scientific Tables, Vol. 2, 8th Ed., 1981, page 53. The micro-organism growth medium was based on data relating to Hook media and FSA media for enterobacteria. This mixture had a pH of 6.6.

#### TEST METHODS:

##### Method 1, the manufacture of absorbent bodies for test purposes

Absorbent bodies were produced with the aid of slightly modified test body formers in accordance with SCAN C 33:80. Fluff pulp and superabsorbent material of a desired kind were weighed and a uniform mixture of fluff pulp and superabsorbent material then passed in an air stream at a subpressure of about 85 mbar through a pipe having a diameter of 5 cm and provided with a bottom-carried metal net and a thin tissue placed on said net. The mixture of fluff pulp and superabsorbent material was collected on the tissue disposed on the metal net and thereafter formed the absorbent body. The absorbent body was weighed and then compressed to a bulk density of 6-12 cm<sup>3</sup>/g. A number of absorbent bodies designated Reference product 1, Reference product 2, test product 1, test product 2, test product 3, test product 4, and so on, of different compositions were then produced as described below. The quantity of absorbent material in the single core and in the double core absorbent bodies was adapted so that the single core bodies and the two core bodies had roughly the same absorption capacity.

##### Method 2, measuring pH in the cellulose pulp

The pH of the cellulose pulp in the various test products was measured by determining the pH of a water extract from the pulp in accordance with SCAN P 14:65. 1.0 g of air-dry cellulose pulp was placed in a 100 ml glass beaker and 20 ml

of distilled water were added. After stirring the mixture a further 50 ml of distilled water were added and the mixture then stirred for about 30 s. And allowed to stand for one hour. The liquid was then poured away and the pH measured with a glass electrode at 20-30°C. Two samples were made and the mean value calculated.

Method 3, measuring the pH of an absorbent body

An absorbent body having a diameter of about 50 mm was produced in accordance with method 1. A certain amount of Test liquid 1, 2 and 3 was added, 10 ml to a single core absorbent body and 20 ml to a double core absorbent body. The absorbent body was then allowed to swell for 30 min., after which the pH of the absorbent body was measured with the aid of a surface electrode, flat bottom Metrohm pH-metre, Beckman Ø12 or Ø72. Parallel measurements were made on at least two different absorbent bodies. The pH was measured at 10 points on each absorbent body and the mean value then calculated.

Method 4, measuring bacteria inhibition in absorbent bodies

Absorbent bodies were prepared in accordance with Method 1. Both single core and double core absorbent bodies were prepared. Test liquid 4 was prepared. Respective bacteria suspensions of Escherichia coli (E.c.), Proteus mirabilis (P.m.), Enterococcus faecalis (E.F.) were cultivated in nutrient broth at 30°C overnight. The graft cultures were diluted and the bacteria content calculated. The cultures were mixed in different proportions such that the final culture mix contained about  $10^4$  organisms per ml of Test liquid 4. The Test liquid 4 was poured into a sterile sputum jar measuring 70.5 x 52 mm, and having a volume of 100 ml, and the absorbent body was placed upside down in the jar and allowed to absorb liquid over a period of 5 min., whereafter

the jar was turned and incubated at 35°C for 0;6 and 12 hours respectively and the bacteria value in the absorbent body then determined. TGE agar was the nutrient used in measuring the total number of bacteria present, and Drigalski agar and Slanetz Bartley agar were used for specific measurement of Escherichia coli and Proteus mirabilis and Enterococcus faecalis respectively.

#### Method 5, measuring the ammonia content

Single core absorbent bodies were prepared in accordance with Method 1. Test liquid and micro-organisms were added in accordance with Method 5, whereafter the jars were incubated at 35°C for 0.3, 6 and 12 hours respectively, whereafter samples were taken from the jars with the aid of a hand pump and so-called Dräger tubes. The ammonia content was then read-off as a colour indication along a scale graduated either in ppm or in percent by volume.

#### Method 6, measuring the surface pH of the skin

Sample products were produced by coating the rear side of absorbent bodies according to reference 3 and Test 4 respectively with a coating of polyethylene that had a weight per unit area of about 25 g/m<sup>2</sup>, and the front side of said bodies with polypropylene nonwoven coating that had a weight per unit area of about 20 g/m<sup>2</sup>. Test liquid 3 was applied to the front side of the test product and absorbed therein. The resultant test products were placed on the forearms of test persons and allowed to remain there for 24 h. The procedure was repeated two times. The surface pH of the skin was

measured at the place of contact prior to applying the test products, and after 24, 48 and 72 h. using a Courage + Khazaka skin pH meter that had a flat bottom Mettler-Toledo glass electrode 403/120.

5

## TEST PRODUCTS:

## Reference product 1:

10 A single core absorbent body having the total weight of 1 gram produced from a conventional superabsorbent material and a conventional chemithermomechanical cellulose pulp in a ratio of 15/85 weight-%.

## Test product 1:

15 A single core absorbent body having a total weight of 1 gram and produced from a partially neutralised superabsorbent material having a pH = 4.2 in accordance with the invention and a chemithermomechanical cellulose pulp having pH = 5.8, in a ratio of 15/85 weight-%.

20

## Test product 2:

25 A single core absorbent body having a total weight of 1 gram and produced from a partially neutralised superabsorbent material having pH = 4.2 in accordance with the invention and a chemithermomechanical cellulose pulp having pH = 3.7, in a ratio of 15/85 weight-%.

## Reference product 2:

A two core absorbent body. The upper core (UC) has a total weight of 1.2 gram and is produced from a conventional superabsorbent material and a conventional chemithermo-mechanical pulp in a ratio of 12/88%. The lower core (LC) has a total weight of 1.1 gram and is produced from a conventional superabsorbent material and a conventional chemical pulp in a ratio of 12/88 weight-%.

Test product 3:

A two core absorbent body. The upper core (UC) had a total weight of 1.3 gram and was produced from a partially neutralised superabsorbent material having pH = 4.5 in accordance with the invention, and a chemithermomechanical pulp having pH 5.8, in a ratio of 15/85%. The lower core (LC) had a total weight of 1.2 gram and was produced from a partially neutralised superabsorbent material having pH = 4.5 in accordance with the invention, and a chemical pulp having pH = 6.3, in a ratio of 15/85 weight-%.

Reference product 3:

A single core absorbent body has a total weight of 1 gram and is produced from conventional superabsorbent material and a conventional chemical cellulose pulp in a ratio of 15/85 weight-%.

Test product 4:

A single core absorbent body having a total weight of 1 gram and produced from a partially neutralised superabsorbent material having pH = 4.2 according to the invention, and a conventional chemical cellulose pulp, in a ratio of 15/85 weight-%.

## Reference product 4:

5 A single core absorbent body having a total weight of 1 gram and produced from a conventional superabsorbent material and a chemithermomechanical cellulose pulp having pH = 6.7, in a ratio of 15/85 weight-%.

## Test product 5:

10 A single core absorbent body having a total weight of 1 gram and produced from a partially neutralised superabsorbent material having pH = 4.2 in accordance with the invention, and a chemithermomechanical cellulose pulp having pH = 6.7, in a ratio of 15/85 weight-%.

## 15 Test product 6:

20 A two core absorbent body. The upper core (UC) has a total weight of 1.3 gram and is produced from a partially neutralised superabsorbent material having pH = 4.6 in accordance with the invention and a chemithermomechanical pulp having pH = 5.8, in a ratio of 15/85%. The lower core (LC) has a total weight of 1.2 gram and is produced from a partially neutralised superabsorbent material having pH = 4.6 in accordance with the invention and a chemical pulp having a pH = 6.3, in a ratio of 15/85 weight-%.

25

## TEST RESULTS:

Example 1

As will be evident from Table 1, the growth of micro-organisms was good in a single core conventional absorbent body according to Reference product 1. Bacteria growth was measured in accordance with Method 4.

Table 1:

Time	Esherichia coli	Proteus mirabilis	Enterococcus faecalis
0 h	3.3	3.1	3.7
6 h	7.0	6.4	7.1
12 h	9.2	9.1	8.3

Example 2

It will be evident from Table 2 that the inhibition of the growth of micro-organisms was good in a single core absorbent body according to Test product 1. Bacteria inhibition was measured in accordance with Method 4.

Table 2:

Time	Esherichia	Proteus	Enterococcus
------	------------	---------	--------------

		22	
	coli	mirabilis	faecalis
0 h	3.2	3.3	3.4
6 h	5.5	3.2	4.8
12 h	7.3	4.0	6.1

Example 3

It will be evident from Table 3 that inhibition of the growth of micro-organisms was good in a single core absorbent body according to Test product 2. The measurements were carried out in accordance with Method 4.

Table 3:

Time	Escherichia coli	Proteus mirabilis	Enterococcus faecalis
0 h	3.4	3.3	3.5
6 h	3.2	2.6	3.6
12 h	2.8	2.0	3.5

10 Example 4

15 It will be evident from Table 4 that the growth of micro-organisms was good in a two core conventional absorbent body according to Reference product 2. The measurements were carried out according to Method 4.

Table 4:

Time	Esherichia		Proteus		Enterococcus	
	coli		mirabilis		faecalis	
	UC*	LC**	UC*	LC**	UC*	LC**
0 h	3.4	3.4	3.4	3.4	3.4	3.4
6 h	6.8	7.0	6.6	6.7	6.7	6.2
12 h	9.0	9.0	9.1	9.0	8.0	7.8

UC\* = upper core, \*\*LC = lower core

#### Example 5

15 It will be evident from Table 5 that the inhibition of the growth of micro-organisms was good in a two core absorbent body according to Test product 3. The measurements were carried out according to Method 4.

Table 5:

Time	Esherichia		Proteus		Enterococcus	
	coli		mirabilis		faecalis	
	UC*	LC**	UC*	LC**	UC*	LC**
0 h	3.4	3.4	3.4	3.4	3.4	3.4
6 h	5.1	5.6	3.3	4.2	4.4	4.5
12 h	7.3	7.4	4.0	4.0	5.9	4.8

10 UC\* = upper core, \*\*LC = lower core

#### Example 6

15 It will be evident from Fig. 9 that the production of ammonia was delayed effectively in a single core absorbent body according to Test product 5, in comparison with a single core conventional absorbent body according to Reference product 4. The measurements were carried out according to Method 5.

Example 7

As will be evident from Fig. 10, after having used a sample product that included an absorbent body according to Test product 4 for a given period of time, the surface pH of the skin established itself at a lower level than in the case of a corresponding sample product containing a conventional superabsorbent material according to Reference product 3, after adding Test liquid 3. The measurements were carried out according to Method 6.

Example 8

As will be evident from Table 6, the pH measured in a single core absorbent body according to Test product 1 lay within the active pH range of 3.5-4.9 after having added test liquid. The measurements were carried out according to Method 3.

Table 6:

	Test liquid 1	Test liquid 2	Test liquid 3
pH	4.29	4.42	4.54

Example 9

As will be seen from Table 7, after having added test liquid the pH measured in a two core absorbent body according to Test product 6 lay within the active pH range of 3.5-4.9. The measurements were carried out according to method 3.

Table 7:

	Test liquid 1	Test liquid 2	Test liquid 3
pH UC*	4.72	4.83	4.80
pH LC**	4.75	4.73	4.73

UC\* = upper core, \*\*LC = lower core

A lower pH thus has a good effect with respect to inhibiting the growth of micro-organisms. When a partially neutralised superabsorbent material is used together with the aforescribed laminate in an absorbent article, further benefits with respect to skin irritation and odour are obtained. The described laminate also presents a drier surface to the skin of the wearer, which also has a good effect with respect to irritation of the skin. As will clearly be seen from Fig. 2 for instance, the weld pattern in the laminate of the inventive article has a three-dimensional structure. This means that less material will lie directly against the wearer's skin, therewith providing a degree of freeness between surface material and the wearer's skin. This reduces the risk of skin irritation caused, for instance, by

chafing and/or by the skin becoming moist as a result of occlusion (heat) and/or because some liquid remains on the top sheet in contact with the wearer's skin after a first wetting.

5

Described below are further embodiments of a laminate 1 used in accordance with the invention. Fig. 3 illustrates a bonding pattern in a laminate 1 whose uppermost sheet or layer lies proximal to the wearer of an inventive absorbent article. The binding pattern consists of rhombic bonding locations 4 disposed in groups 5', with four bonding locations 4 in each group 5'. The bonding pattern shown in Fig. 3 also includes superior group formations 5" comprising four groups 5' each having four bonding locations 4. Thus, three different types of regions 6, 7, 9 having mutually different densities in the material can be identified in the bonding pattern shown in Fig. 3. The densest material structure having the smallest pore size is found in the groups 5' that comprise four bonding locations 4. The less dense regions 7, which have a slightly large pore size, are found in the superior group formations 5" comprising groups 5' each having four bonding locations 4. Regions 9 of the lowest density are found between the superior group formations 5", and between the superior group formations 5" and single groups 5 of bonding locations 4 disposed between the superior group formations 5".

In the case of the Fig. 4 embodiment, the bonding locations 4 have the form of short (1-1.5 mm) dash-like bonds disposed in generally parallel stripe configurations 5 that are mutually spaced apart by a distance that is greater than the distance between the bonding locations 4 in said stripes. Located between the bonding locations 4 in respective stripes are densified regions 6 which have a smaller pore size than the regions 7 situated between said lines or stripes 5.

Figs. 5-7 illustrate further conceivable bonding patterns. The bonding pattern shown in Fig. 5 includes generally parallel, undulating pairs of bonding lines 4 where the distance between the lines 4 of each pair 5 exceeds the distance between the pairs 5 of bonding lines 4. Thus, there is obtained with the bonding pattern shown in Fig. 5 a laminate that includes densified liquid transfer regions between the bonding lines 4 of each pair and bulky, soft and airy spacing regions 7 between the bonding pairs 5.

One advantage that is afforded by arranging the bonding locations 4 in the form of stripes or lines is that a top material that includes such a bonding pattern will conduct liquid along the stripes or lines, and counteract the spread of liquid perpendicular to said stripes or lines. This facility can be used advantageously to reduce the risk of edge leakage in absorbent articles.

Fig. 6 illustrates a pattern which includes groups 5 each consisting of two bonding locations 4 in the form of concentric rings that delimit densified regions 6, while less dense regions 7 are found outside the outer ring of the ring-shaped bonding locations 4.

Fig. 7 shows a pattern which comprises short, parallel dash-like lines 4 arranged in pairs at a given distance apart such as to form densified regions 6 between the dash-like lines 4 in each pair 5 and less dense regions between the pairs of dash-like lines 4.

Fig. 8 illustrates an embodiment of an inventive absorbent article in the form of an incontinence protector or napkin 10 that includes a laminate 1 which has a liquid permeable top sheet 2 and a liquid permeable liquid-transfer sheet 3. The article also includes a liquid-impermeable backing sheet 11 and an absorbent body or pad 12 enclosed between the top sheet 2 and the backing sheet 11. The top sheet 2 and the backing sheet 11 have a slightly greater extension than the absorbent body 12 and protrude slightly beyond the edges of said absorbent body. The top sheet 2 and the backing sheet 11 are joined together along their outwardly protruding parts 13, for instance by gluing or welding with heat or ultrasound.

The absorbent body 12 may be of any conventional kind. Examples of typical absorption material are cellulose fluff pulp, tissue, highly absorbent polymers (so-called superabsorbents), absorbent foam, absorbent nonwoven, and the like. It is also usual to construct absorbent bodies with layers of different materials that have different properties with respect to liquid acquisition capacity, liquid dispersing capacity and storage capacity. Such constructions are well known to the person skilled in this art and need not be described in detail here. The thin absorbent bodies or pads normal at present in, e.g., child diapers and incontinence protectors are often comprised of a compressed mixed or layered structure of cellulose fluff pulp and superabsorbent. According to the invention, the absorbent material is combined with partially neutralised superabsorbent in an absorbent body. As before mentioned, this results in an absorbent article that has a lower pH against the skin in use and that presents a dry surface to the skin. Irritation of the skin and the formation malodorous gases are counteracted by several factors, such as by

inhibited growth of micro-organisms, less chafing of the skin, and less moisture in contact with the skin.

5 The incontinence protector or napkin 10 has an hourglass configuration, including broad end parts 15, 16 and a narrower crotch part 17 situated between said end parts 15, 16. The crotch part 17 is that part of the incontinence protector that is intended to lie between the thighs of the wearer in use and which functions as an acquisition surface  
10 for discharged body fluid.

As before mentioned, provided between the liquid-permeable top sheet 2 and the absorbent body 11 is a porous and resilient liquid transfer sheet 3, e.g. fibre wadding, a  
15 layer of porous foam or a layer of one of the materials mentioned above as being suitable for the second sheet in the laminate shown in Figs. 1 and 2. The liquid transfer sheet 3 receives the liquid that passes through the top sheet 2. Urination often involves the discharge of relatively large  
20 volumes of liquid over a short period of time. It is therefore important that the contact achieved between the liquid permeable top sheet and the inwardly lying liquid transfer sheet 3 is such that liquid is able to penetrate quickly into the liquid transfer sheet 3. Because the liquid  
25 transfer sheet has a high bulk density and a thickness of preferably 0.5-4 mm, the sheet 3 is able to function as a temporary liquid reservoir prior to being absorbed subsequently into the absorbent body 11.

30 In the illustrated embodiment, the liquid transfer sheet 3 is slightly narrower than the absorbent body 11 although extending along the full length of the incontinence protector. One advantage with this design is that it enables

a saving in material consumption to be made. Naturally, a further saving can be made, by making the liquid transfer sheet 3 shorter than the length of the incontinence protector. For instance, one conceivable alternative in this respect is to place the liquid transfer sheet 3 solely at the crotch part 17 of said incontinence protector, since the major part of the body liquid, or fluid, to be absorbed by the incontinence protector can be expected to be discharged within this protector part 17.

Those liquid transfer sheets that are normally used are often very porous and therewith exhibit a relatively large effective mean size, which is often greater than the effective mean pore size of conventional liquid-permeable top sheet material. The effective medium pore size of a fibre material can be measured in accordance with a method described in EP-A-0 470 392. Since liquid strives to pass from coarse capillaries to finer capillaries and not vice versa, as a result of the capillary action, the liquid will tend to remain in the fibre network of the outer material instead of being drained away by the more porous liquid transfer sheet. Consequently, there is a danger that liquid will run on the surface of the outer sheet, or top sheet, and give rise to leakage. The liquid remaining in the fibre structure of the top sheet will also cause the surface of said sheet to be felt to be wet and therewith cause discomfort to the wearer.

By joining the liquid permeable top sheet 2 to the liquid transfer sheet 3 as described with reference to the laminate 1 shown in Figs. 1 and 2, the liquid transfer sheet 3 will be compressed at the bonding locations 4. Thus, the liquid transfer sheet 3 has a density gradient where the density increases in towards respective bonding locations 4. The

liquid transfer sheet 3 will therefore present in a region around the bonding locations 4 a pore size gradient and an area in which the effective medium pore size is smaller than the mean pore size of the liquid permeable top sheet 2. By grouping the bonding locations 4 in accordance with the present invention, it is possible to increase that part of the laminate 1 surface at which the mean pore size of the liquid transfer sheet 3 is smaller than the mean pore size of the liquid permeable top sheet 2.

This enables the liquid transfer sheet 3 to drain liquid away from the top sheet 2 effectively. Because liquid is drained away from the top sheet 2 in the region surrounding respective bonding locations 4 and in the denser regions 6 that lie between the bonding locations 4 in each bonding location group 5, these regions will have a liquid deficit so as to achieve liquid equalisation with the surrounding regions. The top sheet 2 will therewith contain less liquid in total and will consequently be felt to be drier against the skin than would otherwise be the case. Since a lower pH is obtained when using the article, as a result of the partially neutralised superabsorbent material present in the absorbent body, the risk of, e.g., skin irritation is greatly reduced.

By arranging the bonding locations 4 in groups 5 with non-bonded densified regions 6 between said bonding locations 4, it is possible to achieve highly effective liquid transportation from the liquid permeable top sheet 2 to the liquid transfer sheet 3 with relatively few bonds. Further, non-bonded regions 7 are left between the groups 5, therewith giving an undulating or "bumpy" structure to the surface of the incontinence protector 10 that lies proximal to the wearer in use. These non-bonded regions 7 between the bonding

groups 5 are bulky and soft, causing the laminate 1 to be airy and comfortable to wear and also effectively distancing said surface from the wearer's skin so that the skin will be kept dry even when the laminated is wetted.

5.

In order to ensure that an effective liquid transfer is obtained between the liquid transfer sheet 3 and the absorbent body 11, the absorbent body will preferably have a greater affinity to liquid than the liquid transfer sheet 3.

10 This can be achieved, for instance, by making the liquid transfer sheet 3 less hydrophilic than the absorbent body 11 and/or by giving the absorbent body 11 a finer capillary structure than the liquid transfer sheet 3.

15 It will be understood that the invention is not restricted to the described exemplifying embodiments thereof and that a number of variants and modifications are conceivable within the scope of the following Claims.

20 By the word "comprise" as used in this document is meant include although with no limitation.

## CLAIMS

1. An absorbent article, such as a diaper, sanitary napkin, incontinence protector, wound dressing or the like, comprising an absorbent body (12) enclosed between a liquid-impermeable backing sheet (11) and a material laminate (1) in the form of a liquid permeable, fibrous sheet of material (2) forming a top sheet (2), and a liquid-permeable, porous and resilient sheet of material (3), forming a liquid transfer sheet (3) lying proximal to the absorbent body (12), wherein the laminate (1) has a planar extension and a thickness direction perpendicular to said planar extension, wherein at least one of the sheets (2, 3) includes thermoplastic material, and wherein the two sheets (2, 3) are joined together through the medium of bonding locations (4) on the laminate (1) within which the thermoplastic material is caused to at least partially soften or melt and thereby join together said two sheets (2, 3), **characterised** in that the absorbent body includes partially neutralised superabsorbent; and in that the sheet-joining regions of the laminate extend in the thickness direction of said laminate (1) through the top sheet (2) and at least partially through the liquid transfer sheet (3).

2. An absorbent article according to Claim 1, **characterised** in that the laminate bonding regions are disposed in two or more groups (5) where each group includes at least two bonding locations (4), wherein the largest relative distance between two mutually adjacent bonding locations (4) in a given group (5) is smaller than the smallest distance between a group (5) and its nearest neighbouring group (5), wherein the laminate (1) includes between the bonding locations (4) in each bonding group (5) first non-bonded laminate regions

(6) that have a greater density than second non-bonded laminate regions (9) located between respective bonding groups (5).

5 3. An absorbent article according to Claim 1 or 2, **characterised** in that the superabsorbent has a degree of neutralisation such that the pH in the absorbent body of the article when wetted will lie in the range of 3.5-4.9, preferably 4.1-4.7.

10

4. An absorbent article according to Claim 2 or 3, **characterised** in that the laminate bonding locations (4) include punctiform bonds, linear bonds, rectangular bonds or circular bonds.

15

5. An absorbent article according to any one of the preceding Claims, **characterised** in that the top sheet (2) has through-penetrating holes within the bonding locations (4).

20

6. An absorbent article according to any one of the preceding Claims, **characterised** in that the top sheet (2) is comprised of a nonwoven material.

25

7. An absorbent article according to any one of the preceding Claims, **characterised** by carded, thermobonded nonwoven material.

8. An absorbent article according to any one of the preceding Claims, **characterised** in that the liquid transfer

sheet (3) is a fibre wadding sheet having a thickness of 0.5-4 mm.

5 9. An absorbent article according to any one of the preceding Claims, **characterised** in that the smallest distance x between two mutually adjacent groups (5) of bonding locations (4) is at least twice the size of the greatest distance y between two mutually adjacent bonding locations (4) in respective groups (5).

10 10. An absorbent article according to Claim 9, **characterised** in that the ratio of x/y between the distances x and y is from 2/1 to 12/1.

15 11. An absorbent article according to Claim 9 or 10, **characterised** in that x is 2-6 mm and y is 0.5-1 mm.

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 99/02370

## A. CLASSIFICATION OF SUBJECT MATTER

IPC7: A61L 15/46, A61L 15/60

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: A61L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	DE 19512005 A1 (WIRKELASTIC GMBH), 31 August 1995 (31.08.95), column 3, line 46 - line 51, abstract --	1-11
Y	US 5522811 A (TAKAMITSU IGAUE ET AL), 4 June 1996 (04.06.96), figure 2, abstract --	1-11
Y	EP 0202126 A2 (THE PROCTER & GAMBLE COMPANY), 20 November 1986 (20.11.86), page 16, line 1 - line 27, abstract --	1-11

☒ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

- \* Special categories of cited documents:
- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed
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- "X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "&" document member of the same patent family

Date of the actual completion of the international search

30 March 2000

Date of mailing of the international search report

20-04-2000

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 99/02370

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0391108 A2 (CASSELLA AKTIENGESELLSCHAFT), 10 October 1990 (10.10.90), page 8, claims 8,9, abstract  -- -----	1-11

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**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.  
**PCT/SE 99/02370**

Patent document cited in search report			Publication date	Patent family member(s)	Publication date
DE	19512005	A1	31/08/95	NONE	
US	5522811	A	04/06/96	AU 671314 B AU 5180393 A CA 2103477 A,C CN 1091627 A DE 59305961 D EP 0608512 A,B SE 0608512 T3 ES 2101203 T GB 2272917 A,B JP 6166937 A	22/08/96 09/06/94 31/05/94 07/09/94 00/00/00 03/08/94  01/07/97 01/06/94 14/06/94
EP	0202126	A2	20/11/86	SE 0202126 T3 AT 113482 T AU 577016 B AU 5741686 A CA 1259175 A DE 3650117 D,T DK 169694 B DK 226386 A EG 17694 A FI 87310 B,C FI 862009 A GB 2175211 A,B GR 861237 A HK 10692 A IE 64373 B JP 62033804 A KR 9401377 B MX 168802 B PH 23760 A PT 82572 A,B SG 102691 G US 4657537 A	15/11/94 08/09/88 20/11/86 12/09/89 24/05/95 16/01/95 16/11/86 30/10/90 15/09/92 16/11/86 26/11/86 28/08/86 31/01/92 26/07/95 13/02/87 21/02/94 09/06/93 03/11/89 01/06/86 17/01/92 14/04/87
EP	0391108	A2	10/10/90	SE 0391108 T3 CA 2013441 A DE 3910563 A DE 59008276 D FI 97474 B,C FI 901385 D JP 2823083 B JP 3163119 A US 5041496 A	01/10/90 04/10/90 00/00/00 13/09/96 00/00/00 11/11/98 15/07/91 20/08/91

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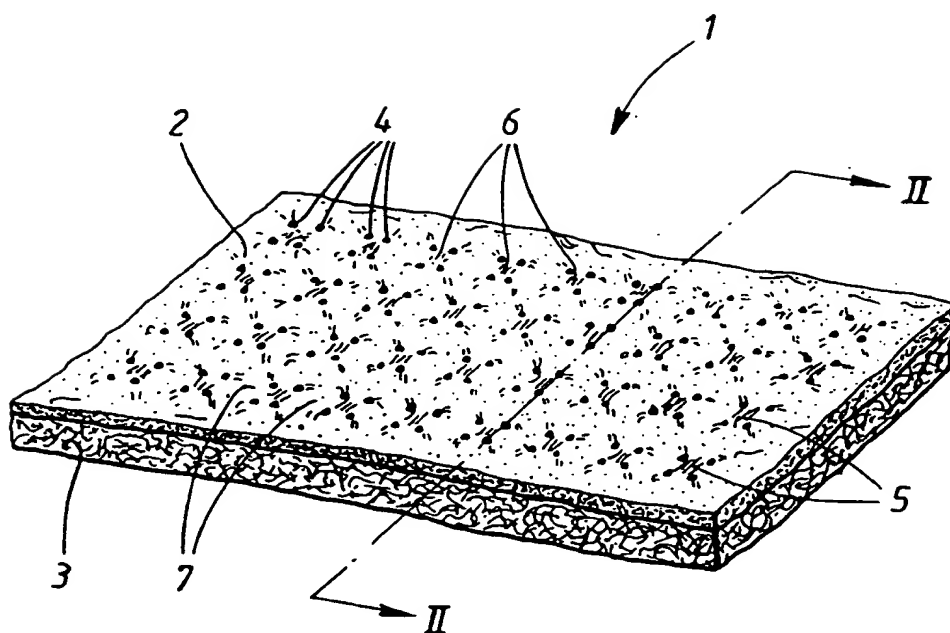


FIG. 1

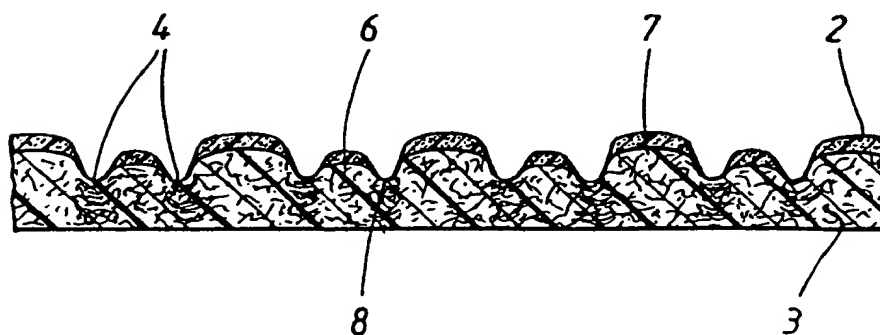


FIG. 2

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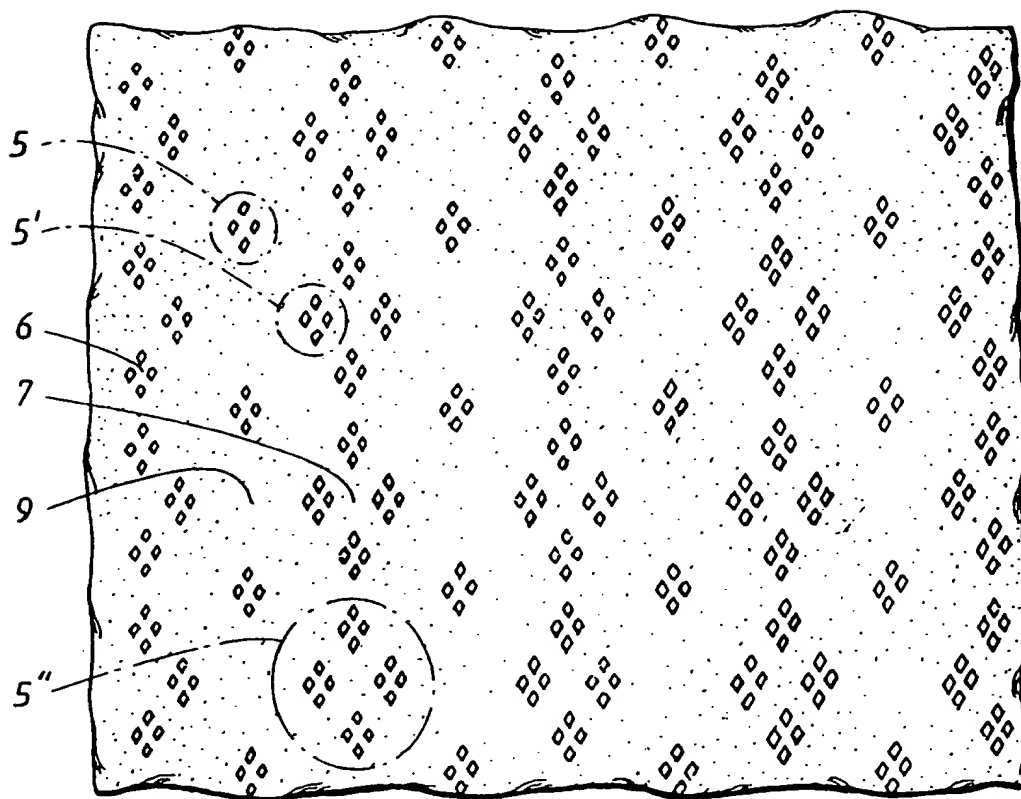


FIG. 3

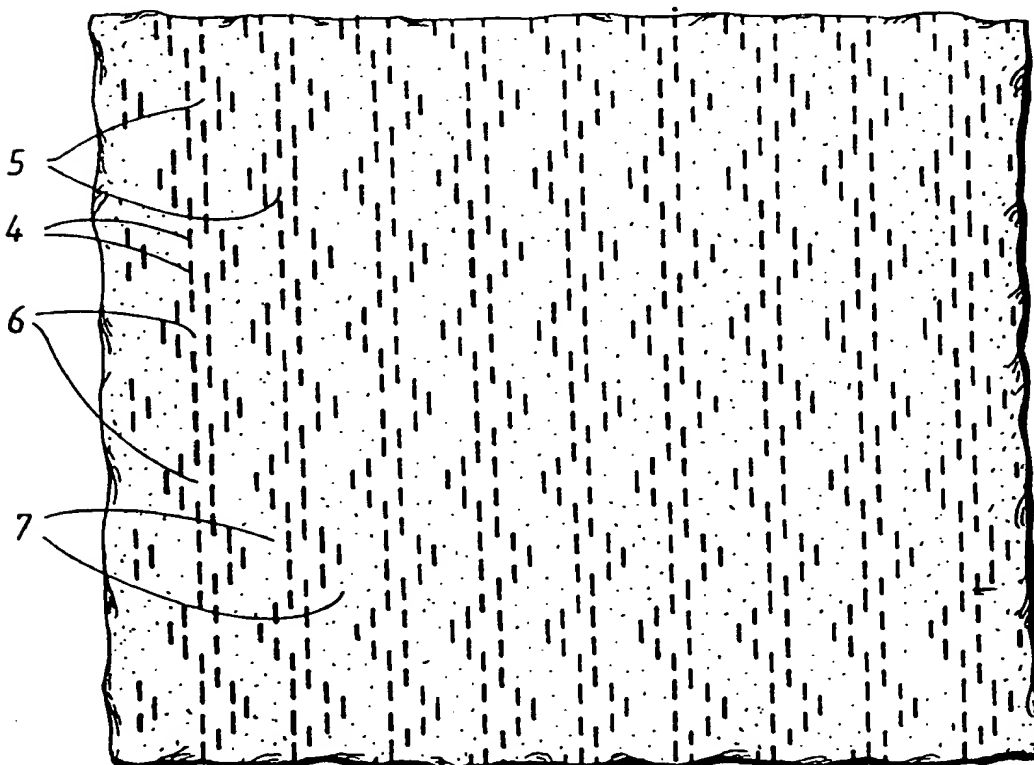


FIG. 4

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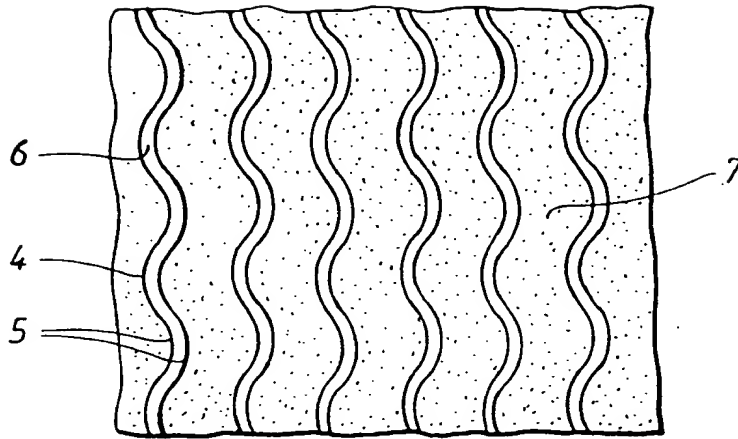


FIG. 5

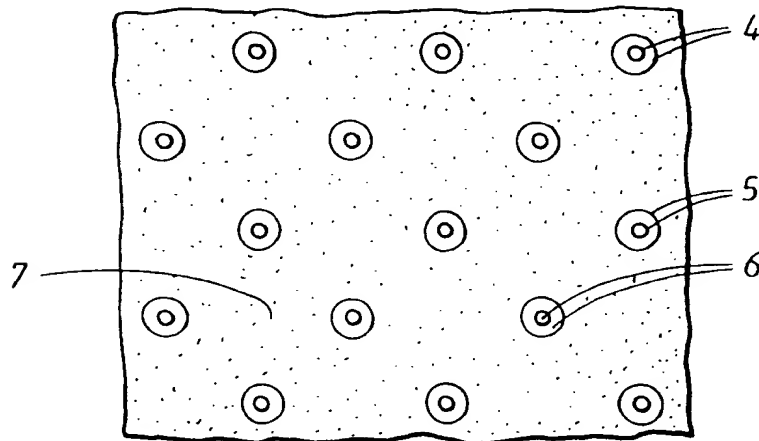


FIG. 6

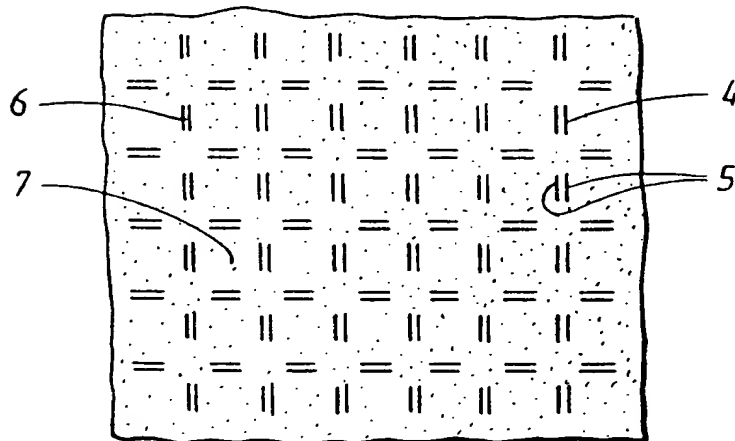


FIG. 7

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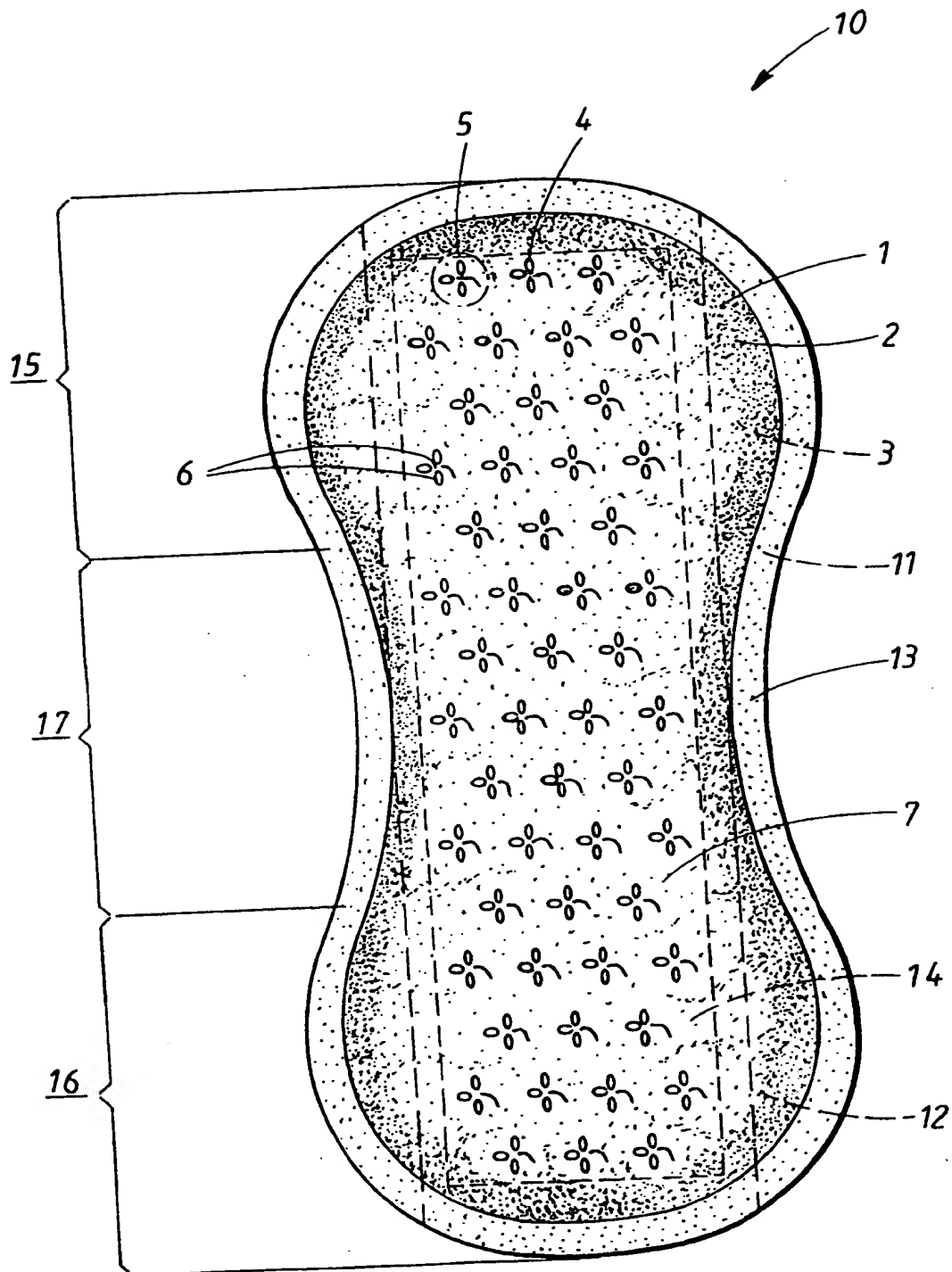
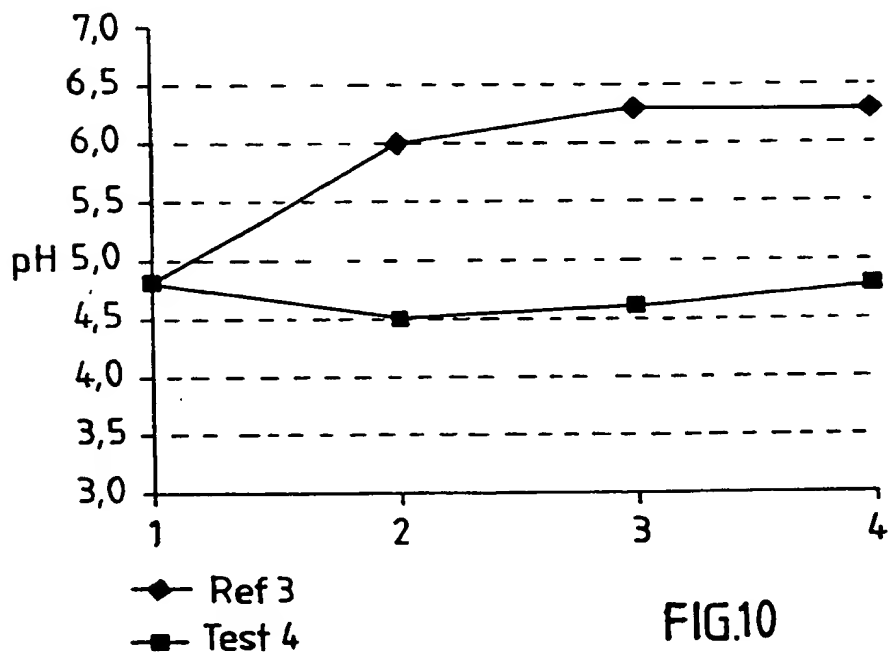
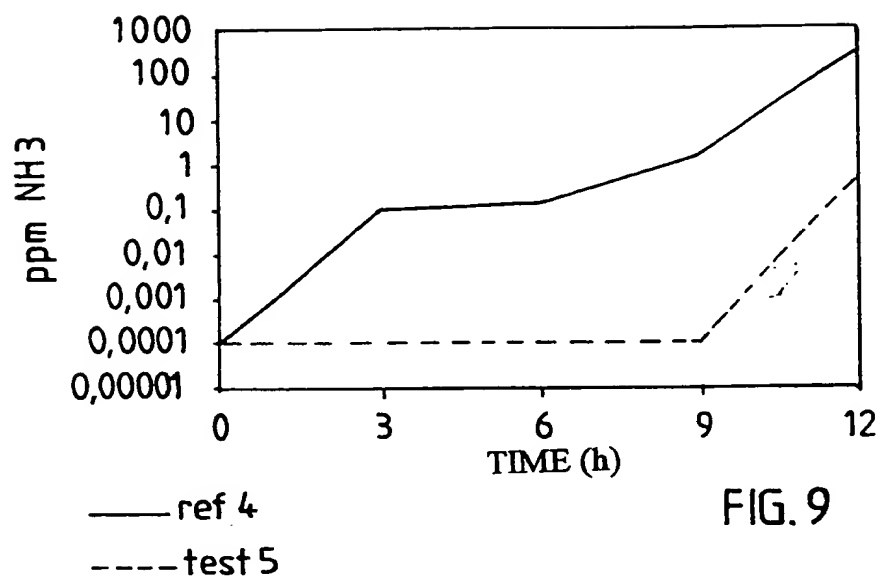


FIG. 8

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**PCT  
REQUEST**

The undersigned request that the present international application be processed according to the Patent Cooperation Treaty.

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International Application No.

PCT/SE 99/02370

International Filing Date

15-12-1999

Name of receiving Office and PCT International Application

**The Swedish Patent Office  
PCT International Application**

Applicant's or agent's file reference 52515-58012  
(if desired) (12 characters maximum)

<b>Box No. I</b>	<b>TITLE OF INVENTION</b> An absorbent article having a material laminate that comprises a liquid permeable top sheet and a liquid permeable liquid transfer sheet	
<b>Box No. II</b>	<b>APPLICANT</b>	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)		<input type="checkbox"/> This person is also inventor.
SCA Hygiene Products AB SE-405 03 GÖTEBORG, Sweden		Telephone No.
		Facsimile No.
		Teleprinter No.
State (that is, country) of nationality: SE		State (that is, country) of residence: SE
This person is the applicant for the purposes of: <input type="checkbox"/> all designated States <input checked="" type="checkbox"/> all designated States except the United States of America <input type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box		
<b>Box No. III</b>	<b>FURTHER APPLICANT(S) AND/OR (FURTHER) INVENTOR(S)</b>	
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country. The country of the address indicated in this Box is the applicant's State (i.e. country) of residence if no State of residence is indicated below.)		This person is:
Ulrika HAGRUD Dr Saléns gata 10 SE-413 22 GÖTEBORG, Sweden		<input type="checkbox"/> applicant only
		<input checked="" type="checkbox"/> applicant and inventor
		<input type="checkbox"/> inventor only (If this check-box is marked, do not fill in below.)
State (that is, country) of nationality: SE		State (that is, country) of residence: SE
This person is the applicant for the purposes of: <input type="checkbox"/> all designated States <input type="checkbox"/> all designated States except the United States of America <input checked="" type="checkbox"/> the United States of America only <input type="checkbox"/> the States indicated in the Supplemental Box		
<input type="checkbox"/> Further applicants and/or (further) inventors are indicated on a continuation sheet.		
<b>Box No. IV</b>	<b>AGENT OR COMMON REPRESENTATIVE; OR ADDRESS FOR CORRESPONDENCE</b>	
The person identified below is hereby/has been appointed to act on behalf of the applicant(s) before the competent International Authorities as:		<input checked="" type="checkbox"/> agent <input type="checkbox"/> common representative
Name and address: (Family name followed by given name; for a legal entity, full official designation. The address must include postal code and name of country.)		Telephone No.
BERG S A; FAGERLIN H; HAMMAR E; LETTSTRÖM R; KIERKEGAARD, L-O; LAGMAN, S; AXELL, K; LARSSON, K ALBIHNS PATENTBYRÅ STOCKHOLM AB, P.O. Box 5581, S-114 85 STOCKHOLM, Sweden		+46 8 59 88 72 00
		Facsimile No.
		+46 8 59 88 73 00
		Teleprinter No.
		11942 ALBIHNS S
<input type="checkbox"/> Address for correspondence: Mark this check-box where no agent or common representative is/has been appointed and the space above is used instead to indicate a special address to which correspondence should be sent.		

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**Box No. V DESIGNATION OF STATES**

The following designations are hereby made under Rule 4.9(a) (mark the applicable check-boxes; at least one must be marked):

**Regional Patent**

- ☒ **AP** **ARIPO Patent:** GH Ghana, GM Gambia, KE Kenya, LS Lesotho, MW Malawi, SD Sudan, SL Sierra Leone, SZ Swaziland, UG Uganda, ZW Zimbabwe, and any other State which is a Contracting state of the Harare Protocol and of the PCT
- ☒ **EA** **Eurasian Patent:** AM Armenia, AZ Azerbaijan, BY Belarus, KG Kyrgyzstan, KZ Kazakstan, MD Republic of Moldova, RU Russian Federation, TJ Tajikistan, TM Turkmenistan, and any other State which is a Contracting State of the Eurasian Patent Convention and of the PCT
- ☒ **EP** **European Patent:** AT Austria, BE Belgium, CH and LI Switzerland and Liechtenstein, CY Cyprus, DE Germany, DK Denmark, ES Spain, FI Finland, FR France, GB United Kingdom, GR Greece, IE Ireland, IT Italy, LU Luxembourg, MC Monaco, NL Netherlands, PT Portugal, SE Sweden, and any other State which is Contracting State of the European Patent Convention and of the PCT
- ☒ **OA** **OAPI Patent:** BF Burkina Faso, BJ Benin, CF Central African Republic, CG Congo, CI Côte d'Ivoire, CM Cameroon, GA Gabon, GN Guinea, GW Guinea-Bissau, ML Mali, MR Mauritania, NE Niger, SN Senegal, TD Chad, TG Togo, and any other State which is member State of OAPI and a Contracting State of the PCT (if other kind of protection or treatment desired, specify on dotted line).....

**National Patent (if other kind of protection or treatment desired, specify on dotted line):**

- |   |  |
|---|--|
| <input checked="" type="checkbox"/> <b>AE</b> United Arab Emirates .....                  | <input checked="" type="checkbox"/> <b>LS</b> Lesotho .....  |
| <input checked="" type="checkbox"/> <b>AL</b> Albania .....                               | <input checked="" type="checkbox"/> <b>LT</b> Lithuania .....  |
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| <input checked="" type="checkbox"/> <b>AT</b> Austria .....                               | <input checked="" type="checkbox"/> <b>LV</b> Latvia .....   |
| <input checked="" type="checkbox"/> <b>AU</b> Australia .....                             | <input checked="" type="checkbox"/> <b>MD</b> Republic of Moldova .....                                      |
| <input checked="" type="checkbox"/> <b>AZ</b> Azerbaijan .....                            | <input checked="" type="checkbox"/> <b>MG</b> Madagascar .....   |
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| <input checked="" type="checkbox"/> <b>BG</b> Bulgaria .....                              | <input checked="" type="checkbox"/> <b>MW</b> Malawi .....   |
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| <input checked="" type="checkbox"/> <b>BY</b> Belarus .....                               | <input checked="" type="checkbox"/> <b>NO</b> Norway .....   |
| <input checked="" type="checkbox"/> <b>CA</b> Canada .....                                | <input checked="" type="checkbox"/> <b>NZ</b> New Zealand .....  |
| <input checked="" type="checkbox"/> <b>CH and LI</b> Switzerland and Liechtenstein .....  | <input checked="" type="checkbox"/> <b>PL</b> Poland .....   |
| <input checked="" type="checkbox"/> <b>CN</b> China .....                                 | <input checked="" type="checkbox"/> <b>PT</b> Portugal .....   |
| <input checked="" type="checkbox"/> <b>CU</b> Cuba .....                                  | <input checked="" type="checkbox"/> <b>RO</b> Romania .....  |
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| <input checked="" type="checkbox"/> <b>GB</b> United Kingdom .....                        | <input checked="" type="checkbox"/> <b>SL</b> Sierra Leone .....   |
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| <input checked="" type="checkbox"/> <b>HU</b> Hungary .....                               | <input checked="" type="checkbox"/> <b>UG</b> Uganda .....   |
| <input checked="" type="checkbox"/> <b>ID</b> Indonesia .....                             | <input checked="" type="checkbox"/> <b>US</b> United States of America .....                                 |
| <input checked="" type="checkbox"/> <b>IL</b> Israel .....                                | <input checked="" type="checkbox"/> <b>UZ</b> Uzbekistan .....   |
| <input checked="" type="checkbox"/> <b>IN</b> India .....                                 | <input checked="" type="checkbox"/> <b>VN</b> Viet Nam .....   |
| <input checked="" type="checkbox"/> <b>IS</b> Iceland .....                               | <input checked="" type="checkbox"/> <b>YU</b> Yugoslavia .....   |
| <input checked="" type="checkbox"/> <b>JP</b> Japan .....                                 | <input checked="" type="checkbox"/> <b>ZA</b> South Africa .....   |
| <input checked="" type="checkbox"/> <b>KE</b> Kenya .....                                 | <input checked="" type="checkbox"/> <b>ZW</b> Zimbabwe .....   |
| <input checked="" type="checkbox"/> <b>KG</b> Kyrgyzstan .....                            | Check boxes reserved for designating States which have become party to the PCT after issuance of this sheet: |
| <input checked="" type="checkbox"/> <b>KP</b> Democratic People's Republic of Korea ..... | <input checked="" type="checkbox"/> <b>CR</b> Costa Rica .....   |
| <input checked="" type="checkbox"/> <b>KR</b> Republic of Korea .....                     | <input checked="" type="checkbox"/> <b>DM</b> Dominica .....   |
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| <input checked="" type="checkbox"/> <b>LC</b> Saint Lucia .....                           | <input checked="" type="checkbox"/> <b>TZ</b> United Republic of Tanzania .....                              |
| <input checked="" type="checkbox"/> <b>LK</b> Sri Lanka .....                             |  |
| <input checked="" type="checkbox"/> <b>LR</b> Liberia .....                               |  |

**Precautionary Designation Statement:** In addition to the designations made above, the applicant also makes under Rule 4.9(b) all other designations which would be permitted under the PCT except any designation(s) indicated in the Supplemental Box as being excluded from the scope of this statement. The applicant declares that those additional designations are subject to confirmation and that any designation which is not confirmed before the expiration of 15 months from the priority date is to be regarded as withdrawn by the applicant at the expiration of that time limit. (Confirmation of a designation consists of the filing of a notice specifying that designation and the payment of the designation and confirmation fees. Confirmation must reach the receiving Office within the 15-month time limit.)

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<b>Box No. VI PRIORITY CLAIM</b>		<input type="checkbox"/> Further priority claims are indicated in the Supplemental Box		
Filing date of earlier application (day/month/year)	Number of earlier application	Where earlier application is:		
		National application: country:	regional application:* regional Office	international application: receiving Office
item (1) 16 December 1998 16/12/98	9804360-7	SE		
item (2)				
item (3)				

☒ The receiving Office is requested to prepare and transmit to the International Bureau a certified copy of the earlier application(s) (only if the earlier application was filed with the Office which for the purposes of the present international application is the receiving Office) identified above as item(s): 1

\* Where the earlier application is an ARIPO application, it is mandatory to indicate in the Supplemental Box at least one country party to the Paris convention for the Protection of Industrial Property for which that earlier application was filed (Rule 4.10(b)(ii)). See supplemental Box.

**Box No. VII INTERNATIONAL SEARCHING AUTHORITY**

**Choice of International Searching Authority (ISA)** (If two or more international Searching Authorities are competent to carry out the international search, indicate the Authority chosen; the two-letter code may be used):

ISA /SE

**Request to use results of earlier search; reference to that search** (if an earlier search has been carried out by or requested from the International Searching Authority):

Date (day/month/year): 16 July 1999 Number SE98/01441 Country (or regional Office): SE

**Box No. VIII CHECK LIST; LANGUAGE OF FILING**

This international application contains the following **number of sheets**:

request: 3

description (excluding

sequence listing part): 27

claims: 2

abstract: 1

drawings: 5

sequence listing part

of description: 38

**Total number of sheets:** 38

This international application is **accompanied by** the item(s) marked below:

1. ☒ fee calculation sheet
2. ☒ separate signed power of attorney, ~~WILL BE FILED LATER~~ (2)
3. ☐ copy of general power of attorney; reference number, if any:
4. ☐ statement explaining lack of signature
5. ☐ priority document(s) identified in Box No. VI as item(s):
6. ☐ translation of international application into (language):
7. ☐ separate indications concerning deposited microorganism or other biological material
8. ☐ nucleotide and/or amino acid sequence listing in computer readable form
9. ☒ other (specify): SE 98/01441

**Figure of the drawings** which should accompany the abstract:

**Language of filing of the** International application: Swedish

**Box No. IX SIGNATURE OR APPLICANT OR AGENT**

Next to each signature, indicate the name of the person signing and the capacity in which the person signs (if such capacity is not obvious from reading the request).



Kristina Axell

15 December 1999

1. Date of actual receipt of the purported international application:	For receiving Office use only	15-12-1999	2. Drawings:
3. Corrected date of actual receipt due to later but timely received papers or drawings completing the purported international application:			<input checked="" type="checkbox"/> received:
4. Date of timely receipt of the required corrections under PCT-Article 1(2):			<input type="checkbox"/> not received:
5. International Searching Authority (if two or more are competent): <u>ISA/SE</u>	6. <input type="checkbox"/> Transmittal of search copy delayed until search fee is paid		

Date of receipt of the record copy by the International Bureau:

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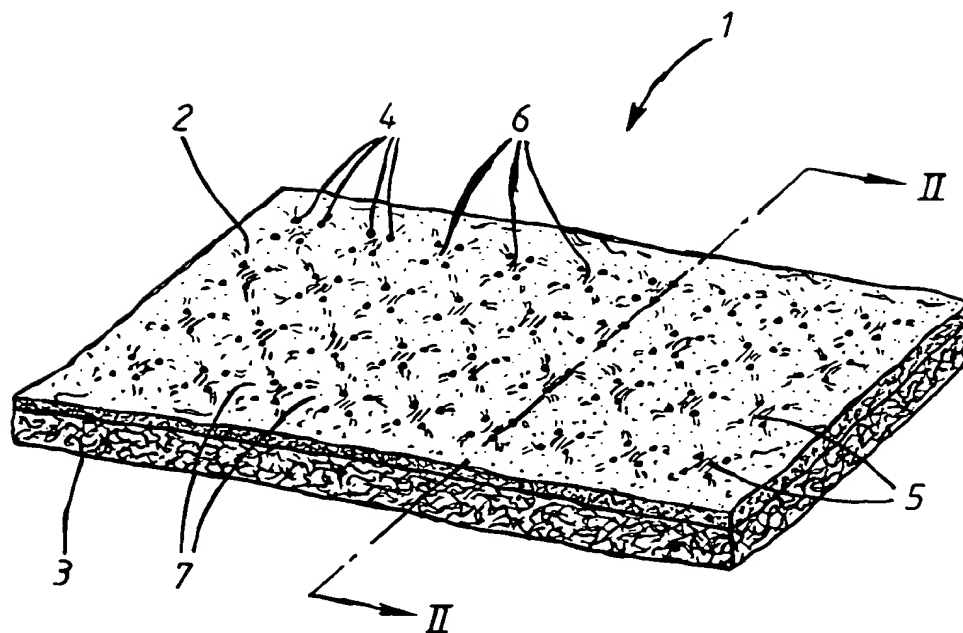


FIG. 1

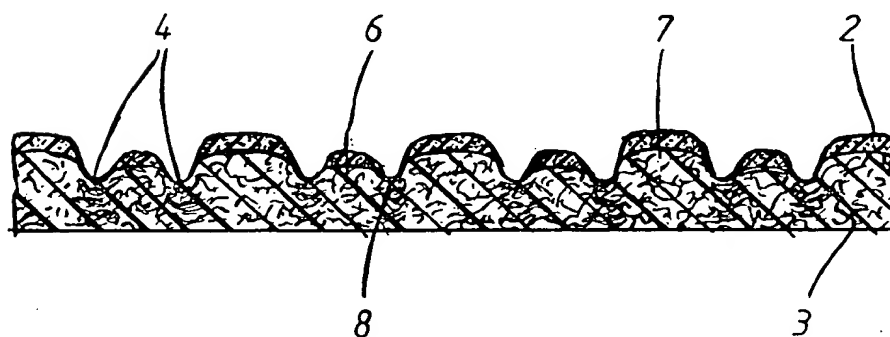


FIG. 2

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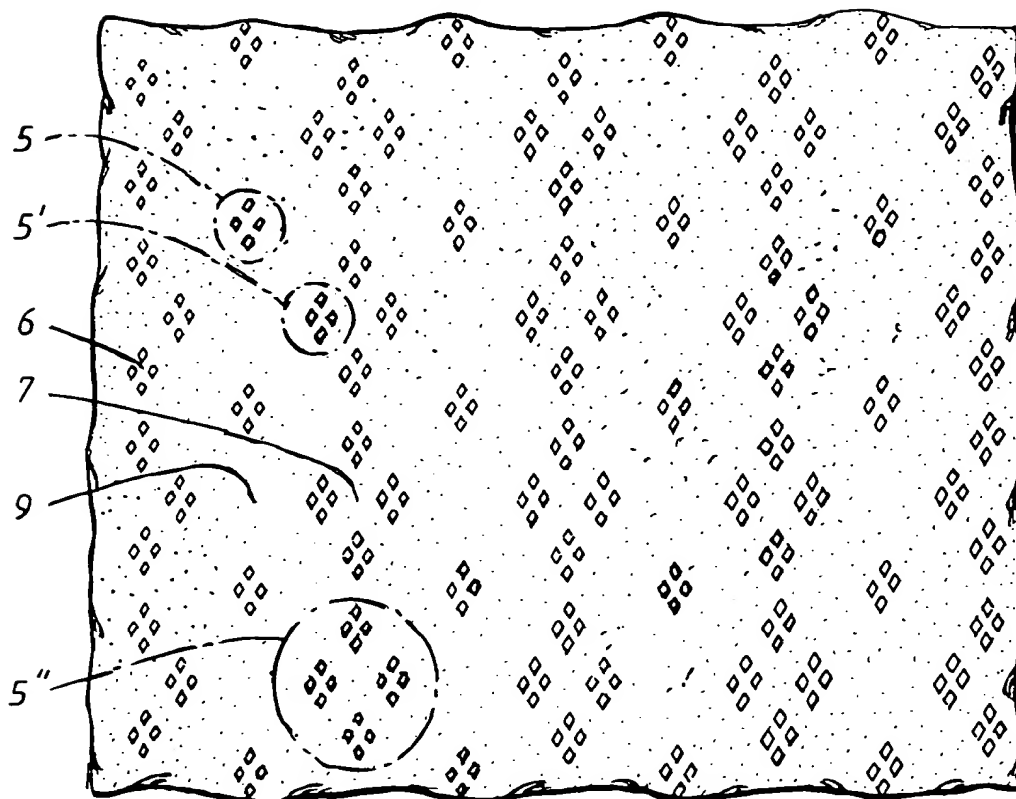


FIG. 3

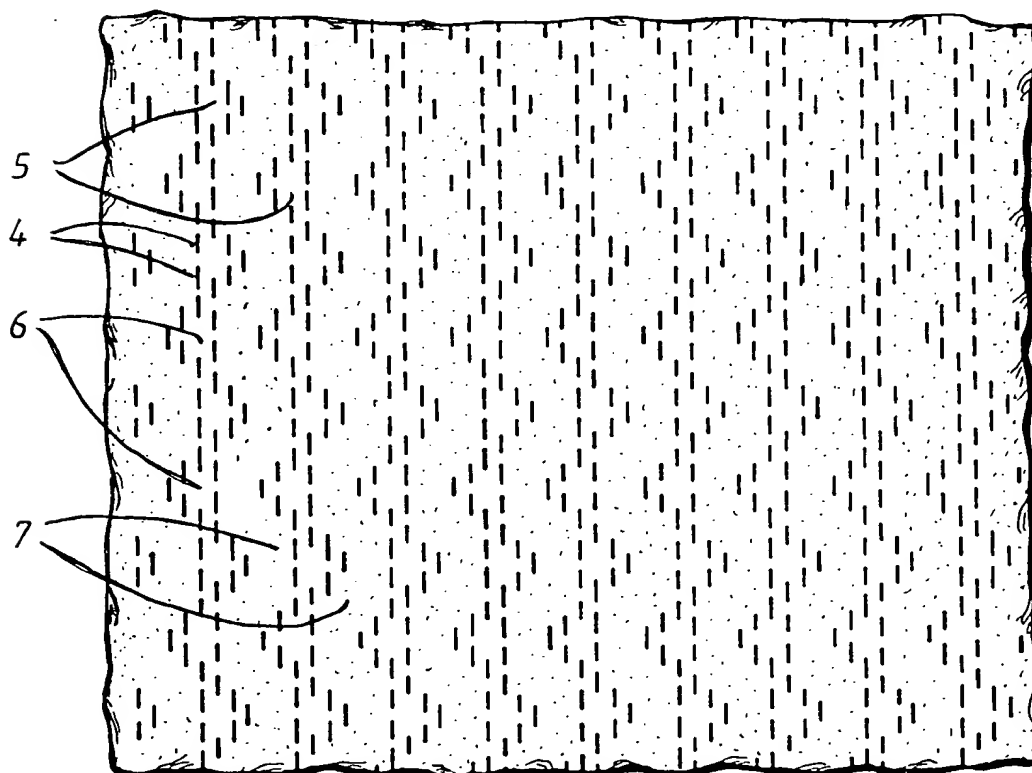


FIG. 4

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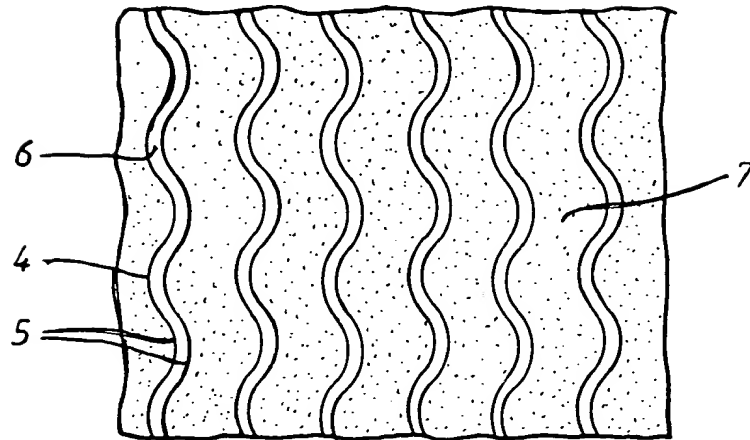


FIG. 5

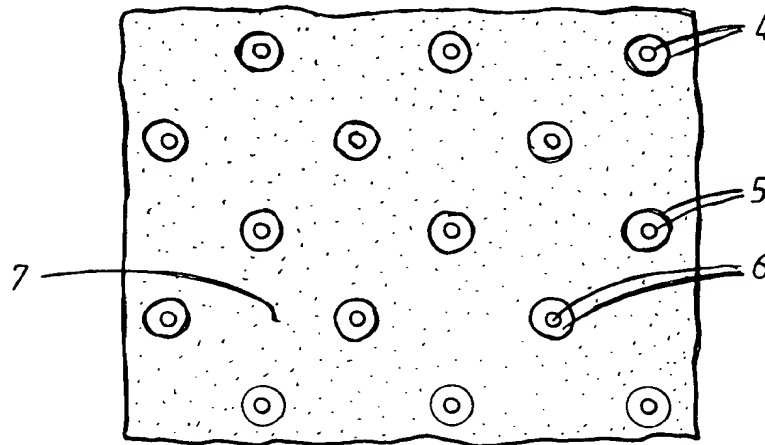


FIG. 6

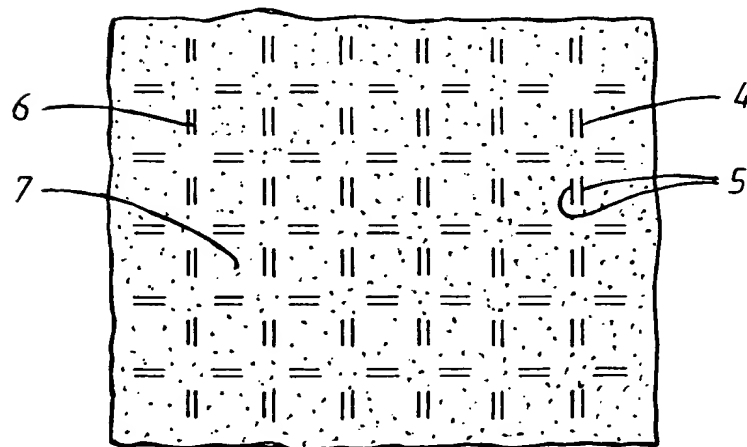


FIG. 7

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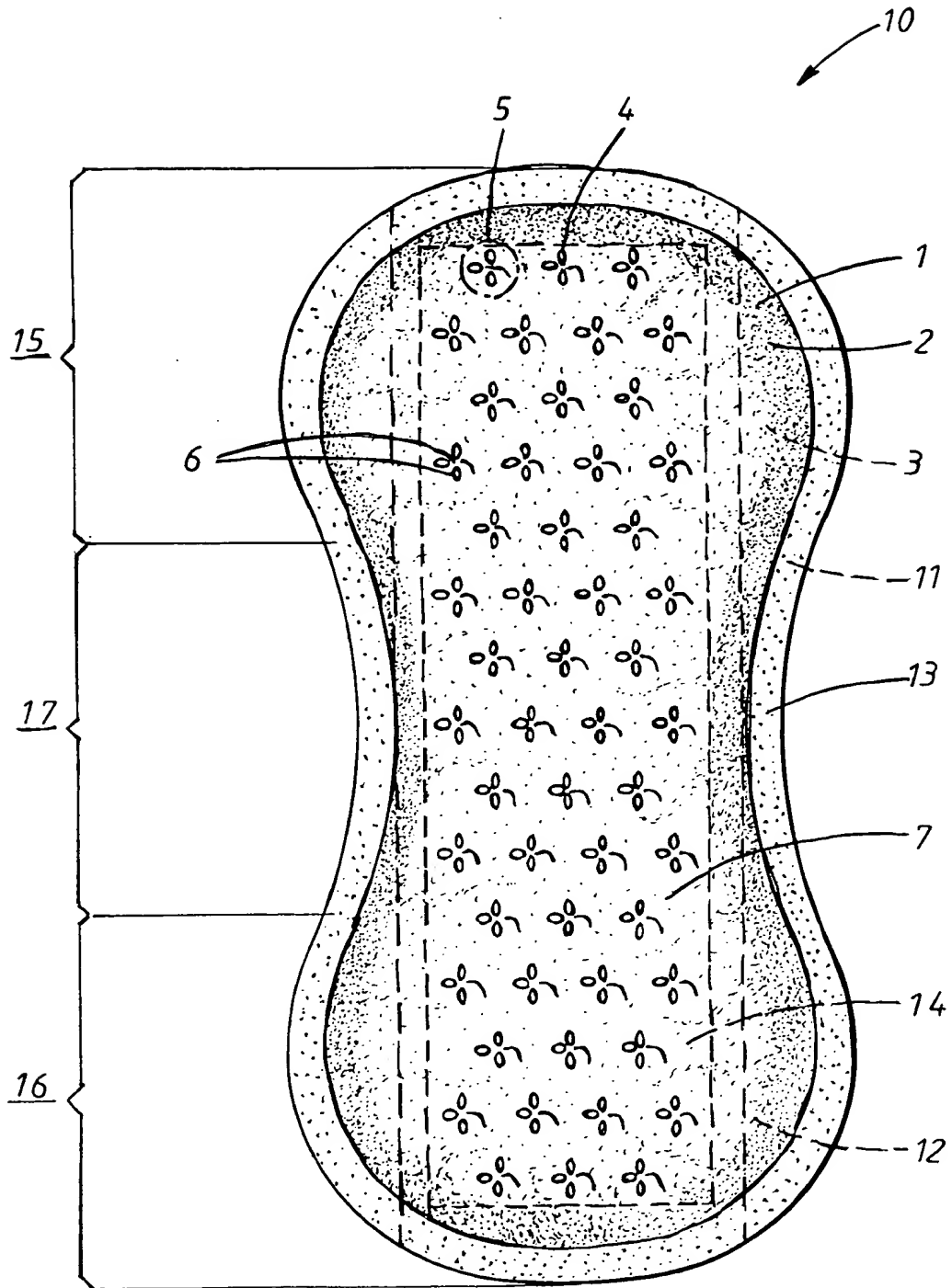
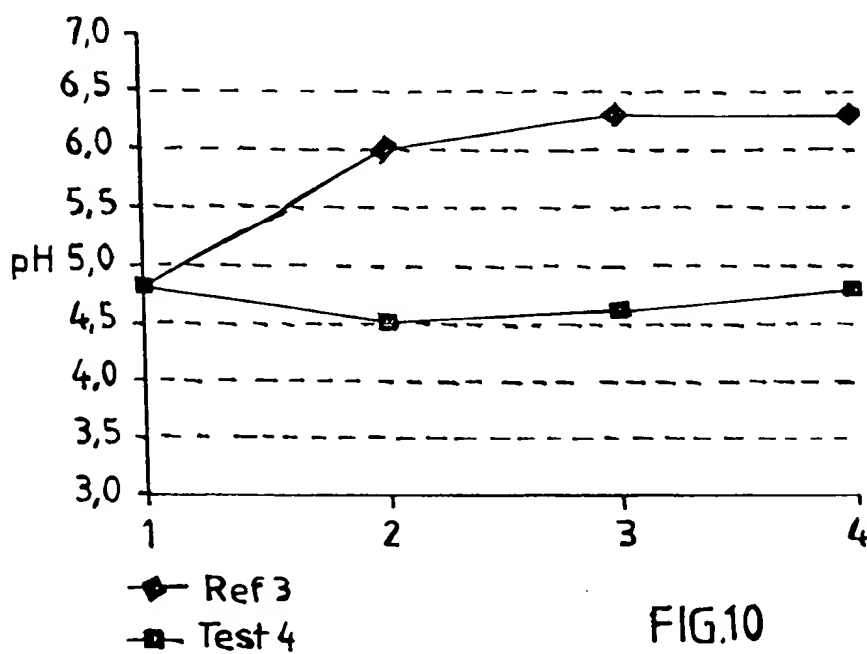
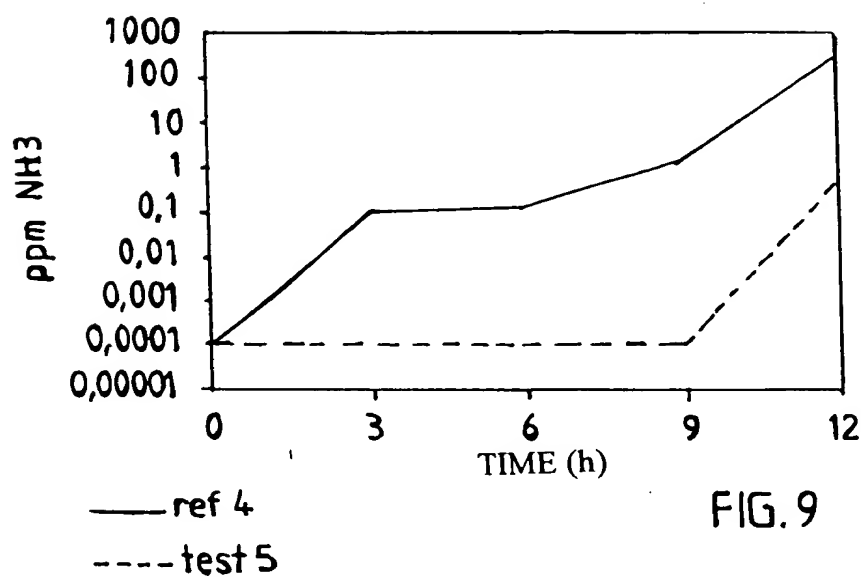


FIG. 8

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## SCA HYGIENE PRODUCTS AB

Absorberande alster med ett materiallaminat innefattande ett vätskegenomsläppligt ytskikt och ett vätskegenomsläppligt vätskeöverföringsskikt.

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Föreliggande uppfinning avser ett absorberande alster innefattande en absorptionskropp innesluten mellan ett vätsketätt bottenskikt och ett materiallaminat i form av ett vätskegenomsläppligt ytskikt och ett vätskegenomsläppligt vätskeöverföringsskikt, med det vätskegenomsläppliga överföringsskiktet vänt mot absorptionskroppen.

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Bakgrund

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Vanliga problem vid användning av absorberande alster, såsom blöjor, bindor, inkontinensskydd eller liknande, är att användningen av sådana alster kan leda till oönskade sidoeffekter såsom hudirritationer och problem med dålig lukt. Dessa problem kan uppstå p g av ocklusion, fukt, mekaniska, mikrobiella och enzymatiska faktorer, vilka alla i olika grad samverkar och förstärker varandras påverkan. Flera icke-önskade sidoeffekter kan uppstå till följd av eller i samband med en

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US 3 794 034 beskriver betydelsen av pH i ett absorberande alster och impregnering av alstret med buffrande substanser med vars hjälp pH i alstret kan hållas mellan 3,5 och 6,0, vilket är fördelaktigt för såväl tillväxthämning av oönskade bakterier och därmed uppkomst av oönskade lukter, som för att undvika negativ hudpåverkan.

25

Genom patentansökan SE 9702298-2 är det känt att använda ett absorberande alster som innefattar en pH-reglerande substans i form av ett delvis neutraliserat superabsorberande material där pH i alstret efter vätning är mellan 3,5 och 4,9. Ett absorberande alster enligt SE 9702298-2 medför minskad risk för hudirritationer och problem med dålig lukt. Ett konventionellt superabsorberande material har en

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neutralisationsgrad på ca 70 %, medan det delvis neutraliserade superabsorberande materialet har en lägre neutralisationsgrad.

#### Kort beskrivning av uppfinningen

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Ändamålet med föreliggande uppfinning är att ytterligare minska risken för hudirritationer, såsom exempelvis kontaktdermatitis. Detta åstadkommes genom ett absorberande alster med en absorptionskropp som innefattar delvis neutraliserat superabsorberande material, samt med ett vätskegenomsläppligt fibröst ytskikt som vid diskreta områden (exempelvis punkter/linjer) är termiskt sammanbundet med ett poröst vätskeöverföringsskikt.

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Uppfinningen avser således absorberande alster, såsom blöjor, bindor, inkontinensskydd, förband eller liknande, innefattande en absorptionskropp innesluten mellan ett vätsketätt bottenlaminat och ett materiallaminat i form av ett vätskegenomsläppligt fibröst materialskikt som ytskikt, och ett vätskegenomsläppligt, poröst och spänstigt materialskikt som vätskeöverföringsskikt varvid vätskeöverföringsskiktet är vänt mot absorptionskroppen, där materiallaminatet har en planutsträckning och en tjockleksled vinkelrätt mot planutsträckningen, varvid åtminstone ett av materialskikten innefattar termoplastiskt material och de båda materialskikten är inbördes förbundna genom att materiallaminatet uppvisar bindningsställena inom vilka det termoplastiska materialet bringats att åtminstone delvis mjukna eller smälta och därigenom sammanbinda de båda materialskikten, varvid absorptionskroppen innefattar delvis neutraliserad superabsorbent och att materiallaminatets sammanbindningsområden sträcker sig i materiallaminatets tjockleksled genom ytskiktet och åtminstone genom en del av vätskeöverföringsskiktet.

30

I många absorberande alster används plastfilm som ytskikt. Fördelen med en fiberstruktur är att den minskar risken för ocklusion, vilket i sin tur minskar risken för hudirritationer. Det beror på att en fiberstruktur inte är lika tät som en film. Ett fibröst ytskikt uppvisar dessutom vanligtvis en mjukare och lenare yta mot huden,

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vilket medför att den mekaniska påverkan minskar (t ex skavning mot huden då användaren rör sig).

5 Fördelen med ett poröst vätskemottagande skikt mellan det vätskegenomsläppliga ytskiktet och absorptionskroppen, vilket är termiskt sammanbundet med ytskiktet vid diskreta områden, är att det fibrösa ytskiktets luftighet bibehålles bättre än då ytmaterialets hela yta eller åtminstone större del av ytan, binds till det vätskemottagande skiktets yta. Genom de diskreta bindningarna erhålls dessutom vanligtvis, i materiallaminatets tjockleksriktning, en mer komprimerad struktur än i  
10 de obundna partierna, vilket medför att vätskan vid bindningarna lättare styrs i riktning mot den innanförliggande porösa vätskemottagande strukturen.

Då absorptionskroppen innefattar delvis neutraliserat superabsorberande material innebär detta att pH vid användning mot kroppen kommer att sänkas, vilket  
15 motverkar oönskade sidoeffekter såsom dålig lukt och hudirritation. Detta tillsammans med det torrare och mjukare översta skiktet, som är vänt mot användaren, har mycket goda effekter på användaren. En konventionell neutralisationsgrad är ca 70 %, men enligt uppfinningen kommer neutralisationsgraden att vara lägre.

20

Uppfinningen är särskilt lämplig vid användning för att förhindra bl a blöjdermatitis.

Kort beskrivning av figurer:

25 Uppfinningen skall i det följande beskrivas mer utförligt, med hänvisning till de figurer som visas på de bifogade ritningarna.

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Därvid visar:

- Fig 1 en planvy av ett materiallaminat i det absorberande alstret enligt uppfinningen,  
Fig 2 ett snitt utefter linjen II-II genom materiallaminatet i Fig 1,  
Fig 3 ett första bindningsmönster,  
Fig 4 ett andra bindningsmönster,  
Fig 5 ett tredje bindningsmönster,  
Fig 6 ett fjärde bindningsmönster,  
Fig 7 ett femte bindningsmönster, och  
Fig 8 ett inkontinensskydd som en utföringsform enligt uppfinningen  
Fig 9 visar i diagramform utveckling av ammoniak i en referensprodukt, jämfört med en produkt enligt referensprodukt 4.  
Fig 10 visar i diagramform hudens yt-pH vid användning av en testprodukt innehållande en konventionell absorptionskropp, jämfört med användning av en motsvarande testprodukt 4.

Beskrivning av utföringsformer:

5

Uppfinningen avser absorberande alster, såsom blöjor, bindor, inkontinensskydd, förband eller liknande. På Fig 8 visas som exempel ett inkontinensskydd innefattande en absorptionskropp 12 innesluten mellan ett vätsketätt bottenskikt 11 och ett materiallaminat 1 i form av ett vätskegenomsläppligt fibröst materialskikt 2 som ytskikt 2, och ett vätskegenomsläppligt, poröst och spänstigt materialskikt 3 som vätskeöverföringsskikt 3 varvid vätskeöverföringsskiktet 3 är vänt mot absorptionskroppen 12, där materiallaminatet 1 har en planutsträckning och en tjockleksled vinkelrätt mot planutsträckningen, varvid åtminstone ett av materialskikten 2,3 innefattar termoplastiskt material och de båda materialskikten 2,3 är inbördes förbundna genom att materiallaminatet 1 uppvisar bindningsställen 4 inom vilka det termoplastiska materialet bringats att åtminstone delvis mjukna eller smälta

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och därigenom sammanbinda de båda materialskikten 2,3. Absorptionskroppen innefattar delvis neutraliserad superabsorbent. Materiallaminatets sammanbindningsområden sträcker sig i materiallaminatets 1 tjockleksled genom ytskiktet 2 och åtminstone genom en del av vätskeöverföringsskiktet 3.

5

Materiallaminatets 1 bindningsområden är anordnade i två eller flera grupper 5 med minst två bindningsställena 4 i varje grupp 5, varvid det största inbördes avståndet mellan två invid varandra belägna bindningsställena 4 i en viss grupp är mindre än det minsta avståndet mellan varje grupp 5 och dess närmast belägna granngrupp 5, varigenom materiallaminatet 1 uppvisar bindningsfria områden 6 mellan bindningsställena 4 inom varje bindningsgrupp 5 vilka har högre densitet än bindningsfria områden 9 i materiallaminatet vilka är belägna mellan bindningsgrupperna 5.

10

Materiallaminatet beskrives nu närmare med hänvisning till Fig 1-7.

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Det i Fig 1 och 2 visade materiallaminatet 1 innefattar ett första materialskikt 2, ytskiktet 2, samt ett andra materialskikt 3, vätskeöverföringsskiktet 3. Det första materialskiktet 2 utgörs därvid lämpligen av ett förhållandevis tunt nonwoven-material.

20

Nonwoven-material kan framställas med många olika metoder, exempelvis genom kardning eller spinning av ett fiberflor som därefter binds. Vidare kan s.k. melt-blow-teknik användas för att avsätta korta fibrer i form av en fibermatta. Det finns en rad olika sätt att binda fibrerna i ett nonwovenmaterial. Exempelvis kan olika typer av bindemedel användas. Vidare kan värmesmältningsbara komponenter i material utnyttjas för bindning med ultraljud, eller genom värmetillförsel. Andra bindningsmetoder är nålning och hydroentangling. Olika bindningsmetoder kan dessutom kombineras med varandra.

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Då materiallaminatet används som vätskegenomsläppligt ytmaterial på ett absorberande alster, är det första materialskiktet 2, ytskiktet 2, det skikt vilket är

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avsett att vara vänt mot en användare av alstret. Det är därvid viktigt att det första skiktet har en slät, mjuk yta vänd mot användaren.

Det andra materialskiktet 3, vätskeöverföringsskiktet 3, har med fördel större tjocklek än det första materialskiktet 2 och utgörs av ett poröst, spänstigt fiber-material med en tjocklek från 0,5-4 mm. Det andra materialskiktet 3 tjänar som vätskeöverföringsskikt då materiallaminatet är anbragt som ett ytmaterial på ett absorberande alster. Därvid bör det andra materialskiktet 3 ha förmåga att på kort tid ta emot stora mängder vätska, sprida vätska i materialskiktets plan, föra vätskan vidare till en under materiallaminatet 1 anordnad absorptionskropp, samt dessutom kunna tillfälligt lagra vätska som inte hunnit absorberas av absorptionskroppen. Material som är särskilt lämpade för användning i vätskeöverföringsskiktet 3 är syntetfibervaddar, kardade bundna eller obundna fiberskikt, eller bulkiga nonwoven-material. En speciell typ av fibermaterial som kan utnyttjas är s.k. tow, varmed förstås huvudsakligen parallella, långa eller oändliga fibrer, eller fiberfilament vilka föreligger i form av skikt, eller strängar. En annan typ av lämpligt material är porösa hydrofila skummaterial. Det andra materialskiktet kan vidare bestå av två eller flera lager av olika eller samma typ av material.

Som ett på intet sätt begränsande exempel på ett materiallaminat som är det översta skiktet i ett absorberande alster enligt uppfinningen, kan nämnas ett sammansatt nonwoven-material bestående av ett första materialskikt 2 av ett nonwoven-material av syntetfibrer med en ytvikt mellan 10 och 50 g/m<sup>2</sup> och ett andra materialskikt 3 av en vadd av syntetfibrer med en ytvikt mellan 20 och 100 g/m<sup>2</sup>. Åtminstone det första materialskiktet 2 och företrädesvis båda skikten 2,3 innefattar termoplastiskt material. Lämpliga termoplastiska material är polyester såsom polyeten och polypropen, samt polyamider, polyester och liknande. Även olika typer av så kallade bikomponentfibrer kan användas.

De båda materialskikten 2,3 är inbördes förbundna med ett stort antal bindnings-ställen 4. Bindningsställena 4 är därvid i det närmaste punktformiga och har bildats

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genom samtidig komprimering och energitillförsel till materiallaminatet 1. Därvid har det termoplastiska materialet bringats att mjukna, eller smälta vid bindningsställena 4 och därigenom binda samman de båda i materiallaminatet 1 ingående skikten 2,3. Sammanbindningen av det första och det andra materialskiktet 2,3 sker  
5 lämpligen medelst värmebindning, eller genom ultraljudsbindning i form av t ex svetsning. Det bildas härvid svetsmönster som har en tredimensionell struktur.

Bindningsställena 4 är anordnade i grupper 5 med fyra bindningsställena 4 i varje grupp 5. De fyra bindningarna är därvid placerade så att de bildar hörnen i en  
10 kvadrat. De inbördes avståndet mellan bindningsställena 4 i varje grupp är mindre än det inbördes avståndet mellan grupperna 5. Därvid bestäms avståndet inom grupperna 5 såsom det närmaste avståndet mellan intill varandra liggande bindningsställena 4. På motsvarande vis bestäms avståndet mellan grupperna 5 såsom det närmaste avståndet mellan intill varandra liggande grupper 5.

15 Avståndsmätningarna görs, i båda fallen, från bindningsställenas 4 kanter. Det minsta avståndet x mellan intill liggande grupper, mätt mellan de närmast varandra placerade bindningsställena 4 i respektive grupp 5, är lämpligen 2-6 mm och det största avståndet y mellan intill varandra placerade bindningsställena 4 inom grupperna är lämpligen 0,5-1 mm. Det förstnämnda avståndet x är därvid åtminstone  
20 ca dubbelt så stort som det sistnämnda avståndet y. Förhållandet x/y mellan avstånden x och y är 2/1 till 12/1.

Vid avsvälning av det smälta, eller mjuknade termoplastiska materialet i laminatet 1, stelnar detta och tjänar som bindemedel för materiallaminatet. Förutom samman-  
25 bindning av de båda materialskikten 2,3 erhålls därvid en bestående komprimering,  
eller förtätning av den porösa strukturen i materialskikten 2,3. Mest påtaglig är förtätningen vid själva bindningsställena 4. Vidare innebär den speciella placeringen av bindningsställena 4, att det sammanbundna materiallaminatet 1 uppvisar  
kvadratiska områden 6 omgärdade av bindningsställena 4 i grupperna 5 och  
30 uppvisande högre förtätning än områden 7 mellan grupperna 5.

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Det i Fig 1 och 2 visade materiallaminatet 1, är sammanbundet på ett sådant sätt, att det bildats genomgående hål 8 i ytskiktet 2 vid bindningsställena 4. Dessutom är materialet inom och närmast kring bindningsställena 4 kraftigt förtätat, med finare kapillärer än omgivande material. Härigenom utgör bindningsställena områden med ökad förmåga att släppa genom vätska från ytskiktet 2 till vätskeöverföringsskiktet 3.

Även om materiallaminatet 1 visas med genomgående hål 8 i det första materialskiktet 2, ytskiktet 2, är ett sådant utförande inte nödvändigt för uppfinningen. Således omfattas även sådana materiallaminat där bindningsställena 4 uppvisar en yta av mer eller mindre vätskeogenomtränglig karaktär, eller materiallaminatet med både genomgående hål och vätsketäta bindningar. Bindningsställena med låg, eller ingen vätskegenomsläpplighet erhålls exempelvis om materiallaminatet innehåller en hög andel termoplastiskt material som smälts och därefter tillåts stelna till en filmliknande yta. Även om själva bindningsställena 4 är i det närmaste helt vätsketäta, medför den förtätade fiberstrukturen som uppstått kring bindningsställena 4 genom den komprimering som sker i samband med bindningen att området närmast kring varje bindningsställe 4 ändå uppvisar mycket hög vätskeöverföringsförmåga.

Vidare utgör de förtätade områdena 6 innanför bindningsställena 4 i varje grupp 5 av bindningsställena zoner med förhöjd vätskeöverföringsförmåga. Genom att avståndet mellan bindningsställena 4 inom varje grupp 5 är förhållandevis litet och företrädesvis från 0,5 mm till 1 mm, medför komprimeringen i bindningsställena 4 att även området 6 innanför bindningsställena 4 påverkas, så att en tätare struktur erhålls. Således är kapillärstorleken i de förtätade områdena 6 som avgränsas av bindningsställena 4 i medeltal mindre än i områden av materiallaminatet 1 som är belägna mellan grupperna 5 av bindningsställena 4. Detta innebär att materiallaminatet 1 uppvisar en vätskeöverföringsförmåga som i förhållande till bindningsställenas 4 sammanlagda yta är mycket hög. Den sammanlagda bundna ytan utgör företrädesvis 3-11% av den totala ytan. Den förvånansvärt goda vätsketransport- och

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vätskeöverföringsförmågan beror på att inte bara själva bindningsställena 4 och ( områdena omedelbart intill dessa uppvisar förhöjd vätskeöverföringsförmåga, utan ( att även de områden som är belägna mellan bindningsställena 4 i en grupp 5 bidrar ( till den förbättrade vätskeöverföringen. (

5

Genom uppfinningen är det således möjligt att skapa områden med större täthet och ( därmed öka vätsketransportförmåga, men ändå bibehålla hög bulk, mjukhet och ( följsamhet hos materiallaminatet 1. Detta leder till en torrare yta mot användaren ( och eftersom absorptionskroppen innefattar delvis neutraliserad superabsorbent ( 10 erhålles en produkt med ett lägre pH. Därmed minskar risken för oönskade sido- ( effekter såsom dålig lukt och hudirritationer. (

15

All användning av produkter, som appliceras mot hud kan leda till oönskade sido- effekter. Dessa kan uppstå på grund av ocklusion, fukt, mekaniska, mikrobiella och enzymatiska faktorer och de kan förorsaka sidoeffekter såsom hudirritationer, primära eller sekundära hudinfektioner och oönskad lukt. En pH-höjning är en normal händelse vid användning av absorptionsprodukter mot hud. Flera icke önskade sidoeffekter kan emellertid uppstå till följd av eller i samband med en pH-höjning. Exempel på sådana icke önskade sidoeffekter är irritativ kontaktdermatit, 20 som uppvisar ett samband med hudens yt-pH.

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Ett annat exempel på oönskade sidoeffekter är, att vissa bakterier såsom Proteus kan metabolisera ämnen i urin och andra kroppsvätskor och ge upphov till illaluktande ämnen såsom ammoniak och aminer, vilket även orsakar en höjning av pH. Vid högt pH förskjuts jämvikten för många luktande ämnen på sådant sätt, att fler flyktiga komponenter bildas, och därför luktar de mer än vid lågt pH.

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Även mikroorganismers tillväxt gynnas av en miljö såsom i ett absorberande alster där det finns tillgång till bland annat fukt, näring och värme. Höga bakterietal utgör en risk för uppkomst av infektioner. Vidare innebär en hög bakteriell närvaro en ökad risk för uppkomst av obehagliga lukter orsakade av olika substanser som bildas

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vid biologisk eller kemisk nedbrytning av beståndsdelar i kroppsvätskor, såsom urin eller mensvätska. Mikroorganismer har en aktivitet som är starkt pH-beroende och minskar med sjunkande pH.

- 5      Då ett delvis neutraliserat superabsorberande material används i den absorberande strukturen enligt uppfinningen sänks pH. De ovan nämnda oönskade sidoeffekterna minskas alltså i en absorberande struktur enligt uppfinningen.

- 10      Delvis neutraliserat superabsorberande material används i absorberande alster beskrivna i den svenska patentansökan SE 9702298-2. Ett sänkt pH-värde erhålles genom att alstret innefattar en pH-reglerande substans i form av ett delvis neutraliserat superabsorberande material. Det har visat sig att om pH i det absorberande alstret efter vätning, är i intervallet 3,5 - 4,9, eller företrädesvis 4,1 - 4,7, erhålls en märkbart tillväxthämmande effekt på oönskade stammar av mikro-  
15      organismer och uppkomsten av oönskade sidoeffekter, som kan uppstå på grund av användning av alstret, minskas.

- 20      Ett lämpligt, delvis neutraliserat, superabsorberande material kan utgöras t ex av en tvärbunden polyakrylat av det slag som beskrivs i europeiska patentet EP 0 391 108, Casella AG. Även andra typer av superabsorberande material än ovan angivna och som har motsvarande egenskaper kan användas.

- 25      Exempel på samband mellan neutralisationsgrad och pH i det superabsorberande materialet framgår nedan. Dessa uppgifter har hämtats ur ansökan SE 9702298-2.

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Neutralisationsgrad %	pH
18	4,0
25	4,3
30	4,5
35	4,7
45	5,0
60	5,5

- 5 Ur tabellen framgår, att neutralisationsgraden normalt bör vara lägre än 45 % och företrädesvis 35 %. Neutralisationsgraden bör emellertid lämpligen vara högre än ca 20 %. Dessa neutralisationsgrader är även lämpliga för denna uppfinning.

- 15 Vid de neutralisationsgrader som enligt uppfinningen används i den absorberande strukturen i ett absorberande alster erhålles en sur miljö efter vätning, vid användning mot hud, vilket gör att exempelvis tillväxten av mikroorganismer hämmas och dålig lukt och hudirritationer undviks.

- 20 Det absorberande alstret enligt uppfinningen har efter vätning ett pH i absorptionskroppen, i intervallet 3,5 - 4,9, företrädesvis 4,1 - 4,7.

- 25 Ytterligare en fördel med uppfinningen är alltså att man undviker uppkomsten av exempelvis dålig lukt och hudbesvär vid användning av ett absorberande alster mot hud. Den tillväxthämmande effekten grundar sig på att många mikroorganismer har en aktivitet, som är starkt pH-beroende och minskar med sjunkande pH. Enzymer såsom lipaser och proteaser har också en aktivitet, som är starkt pH-beroende och minskar med sjunkande pH. Således leder en sänkning av pH till en minskad aktivitet hos flertalet mikroorganismer och en minskad enzymaktivitet och därmed åstadkommes en minskning av negativ hudpåverkan.

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Följande exempel är hämtade ur SE 9702298-2 för att illustrera effekten i absorberande alster med en absorptionskropp innefattande ett delvis neutraliserat superabsorberande material. Dessutom innehåller absorptionskroppen en cellulosa-massa med ett pH av 2,5 - 8,5.

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En absorberande kropp innehållande absorptionsmaterial och absorberad vätska är till sin natur ett heterogent system ur pH-synpunkt. Systemet kan innehålla superabsorberande material, fibrer och vätska med flera jonslag. För att få reproducerbara pH-värden måste mätningar göras på ett flertal ställen i provkroppen och medelvärdet beräknas.

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#### BESKRIVNING AV EXEMPEL:

Följande exempel är avsedda att närmare illustrera effekten i absorberande alster med en absorptionskropp innefattande en kombination av ett delvis neutraliserat superabsorberande material samt cellulosa-massa med ett pH av 2,5-8,5. Jämförelser gjordes med konventionella material av motsvarande typ.

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#### TESTVÄTSKOR:

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##### Testvätska 1

0,9 % koksaltlösning.

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##### Testvätska 2

Syntetisk urin enligt beskrivning i bl a EP 0 565 606 vilken kan erhållas från Jayco Pharmaceuticals Co, Pennsylvania. Sammansättningen är 2 g/l KCl; 2 g/l Na<sub>2</sub>SO<sub>4</sub>; 0,85 g/l (NH<sub>4</sub>)H<sub>2</sub>PO<sub>4</sub>; 0,15 g/l (NH<sub>4</sub>)<sub>2</sub>HPO<sub>4</sub>; 0,19 g/l CaCl<sub>2</sub> och 0,23 g/l MgCl<sub>2</sub>. pH i denna blandning är 6,0-6,4.

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### Testvätska 3

- 5 Syntetisk urin innehållande följande ämnen: KCl, NaCl, MgSO<sub>4</sub>, KH<sub>2</sub>PO<sub>4</sub>, Na<sub>2</sub>HPO<sub>4</sub>, NH<sub>2</sub>CONH<sub>2</sub>. pH i denna blandning är 6,0 -6,5.

### Testvätska 4

- 10 Steril syntetisk urin till vilken har satts tillväxtmedium för mikroorganismer. Den syntetiska urinen innehåller mono- och divalenta kat- och anjoner samt urea och har beretts enligt uppgifter i Geigy, Scientific Tables, vol 2, 8:th ed. 1981 p53. Tillväxtmediet för mikroorganismer bygger på uppgifter om Hook- och FSA-media för enterobakterier. pH i denna blandning är 6,6.

- 15 TESTMETODER:

#### Metod 1, tillverkning av absorptionskroppar för test

- 20 Absorptionskroppar tillverkades med hjälp av en något modifierad provkroppsformare enligt SCAN C 33:80. Fluffmassa och superabsorberande material av önskad typ vägdes upp, och en jämn blandning av fluffmassa och superabsorberande material fördes därefter in i en luftström med ett undertryck av ca 85 mbar och genom ett rör med en diameter av 5 cm och försett med ett metallnät i botten på vilket en tunn tissue placerats. Blandningen av fluffmassa och superabsorberande material samlades därvid på tissuen på metallnätet och utgjorde därefter
- 25 absorptionskroppen. Absorptionskroppen vägdes därefter och komprimerades till en bulk av 6-12 cm<sup>3</sup>/g. Ett antal absorptionskroppar benämnda Referensprodukt 1, Referensprodukt 2, testprodukt 1, testprodukt 2, testprodukt 3, testprodukt 4 osv. med olika sammansättning enligt nedan tillverkades. Mängden absorptionsmaterial i
- 30 de enkärniga resp tvåkärniga absorptionskropparna anpassades så att enkärniga resp tvåkärniga sinsemellan har ungefär samma absorptionskapacitet.

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Metod 2, mätning av pH i cellulosamassan.

Mätning av pH hos cellulosamassan i de olika provprodukterna gjordes genom  
5 bestämning av pH hos vattenextrakt hos massan enligt SCAN P 14:65. 1,0 g lufttorr  
cellulosamassa placerades i en 100 ml glasbägare och 20 ml destillerat vatten  
tillsattes. Efter omrörning tillsattes ytterligare 50 ml destillerat vatten, och  
blandningen rördes om i ca 30 s och fick stå i 1 tim. Vätskan hälldes av, och pH  
10 mättes med en glaselektrod vid 20-30 ° C. Två prov gjordes, och medelvärdet  
beräknades.

Metod 3, mätning av pH i absorptionskropp.

En absorptionskropp med diameter ca 50 mm tillverkades enligt metod 1. En viss  
15 mängd Testvätska 1, 2 och 3 tillsattes, 10 ml till en enkärnig absorptionskropp och  
20 ml till en tvåkärnig absorptionskropp, varefter absorptionskroppen fick svälla i  
30 min. Därefter mättes i pH i absorptionskroppen med hjälp av en ytelektrod,  
Flatbottnad Metrohm pH-meter, Beckman Ø12 eller Ø72. Parallella mätningar  
utfördes på minst två olika absorptionskroppar. pH mättes på 10 punkter på varje  
20 absorptionskropp och medelvärdet beräknades.

Metod 4, mätning av bakteriehämning i absorptionskroppar.

Absorptionskroppar bereddes enligt metod 1. Såväl enkärniga som tvåkärniga  
25 absorptionskroppar bereddes. Testvätska 4 bereddes. Respektive bakterie-  
suspensioner av Escherichia coli (E.c.), Proteus mirabilis (P.m.), Enterococcus  
faecalis (E.f.) uppodlades i näringsbuljong 30 ° C över natt. Ympkulturerna späddes,  
och bakteriahalten beräknades. Kulturerna blandades i olika proportioner, så att den  
slutliga blandkulturen höll ca 10<sup>4</sup> organismer per ml testvätska 4. Testvätska 4 sattes  
30 till en steril sputumburk 70,5 x 52 mm, volym 100 ml, och absorptionskroppen

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5 placerades upp och ned i burken och fick suga vätska under 5 min, varefter burken vändes och inkuberades i 35 °C i respektive 0; 6 och 12 timmar, varefter bakterievärdet i absorptionskroppen bestämdes. Som näringsmedium användes TGE agar för mätning av totalantal bakterier och Drigalski agar resp Slanetz Bartley agar för specifik mätning av Escherichia coli och Proteus mirabilis resp Enterococcus faecalis.

Metod 5, mätning av ammoniakhalt

10 Enkärniga absorptionskroppar bereddes enligt metod 1. Testvätska och mikroorganismer tillsattes enligt metod 5 varefter burkarna inkuberades i 35 °C i respektive 0, 3, 6 och 12 timmar, varefter provuttag gjordes från burkarna med hjälp av en handpump och s.k. Drägerrör. Ammoniakhalten avläses sedan som ett färgomslag längs en skala graderad antingen i ppm eller volymprocent.

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Metod 6, mätning av hudens yt-pH

Provprodukter tillverkades genom att absorptionskroppar enligt ref. 3 resp test 4 belades med en baksida av ca 25 g/m<sup>2</sup> polyeten och en framsida av ca 20 g/m<sup>2</sup> polypropennonwoven. 7-8 ml Testvätska 3 tillfördes till provprodukten framsida och absorberades i provprodukten. De sålunda erhållna provprodukterna placerades på testpersonens underarmar och fick sitta kvar under 24 h. Förfarandet upprepades två gånger. Hudens yt-pH på kontaktstället mättes före appliceringen samt efter 24, 48 och 72 h med Courage + Khazaka hud-pH-meter med flatbottnad Mettler-Toledo glaselektrod 403/120.

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PROVPRODUKTER:

Referensprodukt 1: Enkärnig absorptionskropp, med totalvikten 1 gram, tillverkad av ett konventionellt superabsorberande material samt en konventionell kemitermomekanisk cellulosamassa

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i förhållande 15/85 vikt-%.

- Testprodukt 1: Enkärnig absorptionskropp, med totalvikten 1 gram, tillverkad av ett delvis neutraliserat superabsorberande material, med pH = 4,2, enligt uppfinningen samt en kemitermomekanisk cellulosamassa med pH = 5,8, i förhållande 15/85 vikt-%.
- Testprodukt: 2 Enkärnig absorptionskropp, med totalvikten 1 gram, tillverkad av ett delvis neutraliserat superabsorberande material, med pH = 4,2, enligt uppfinningen samt en kemitermomekanisk cellulosamassa med pH = 3,7 i förhållande 15/85 vikt-%.
- Referensprodukt 2: Tvåkärnig absorptionskropp. Överkärnan (ök), med totalvikten 1,2, gram, tillverkad av ett konventionellt superabsorberande material samt en konventionell kemitermomekanisk massa i förhållande 12/88%.  
Underkärnan (uk), med totalvikten 1,1 gram, tillverkad av ett konventionellt superabsorberande material samt en konventionell kemisk massa i förhållande 12/88 vikt-%.
- Testprodukt 3: Tvåkärnig absorptionskropp. Överkärnan (ök), med totalvikten 1.3 gram, tillverkad av ett delvis neutraliserat superabsorberande material, med pH = 4,5, enligt uppfinningen samt en kemitermomekanisk massa med pH = 5,8, i förhållande 15/85%. Underkärnan (uk), med totalvikten 1,2 gram, tillverkad av ett delvis neutraliserat superabsorberande material, med pH = 4,5, enligt uppfinningen samt en kemisk massa med pH = 6,3, i

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förhållande 15/85 vikt-%.

Referensprodukt 3: Enkärnig absorptionskropp, med totalvikten 1 gram, tillverkad av ett konventionellt superabsorberande material samt en konventionell kemisk cellulosamassa i förhållande 15/85 vikt-%.

Testprodukt 4: Enkärnig absorptionskropp, med totalvikten 1 gram, tillverkad av ett delvis neutraliserat superabsorberande material, med pH = 4,2, enligt uppfinningen samt en konventionell kemisk cellulosamassa i förhållande 15/85 vikt-%.

Referensprodukt 4: Enkärnig absorptionskropp, med totalvikten 1 gram, tillverkad av ett konventionellt superabsorberande material samt en kemitermomekanisk cellulosamassa, med pH = 6,7, i förhållande 15/85 vikt-%.

Testprodukt 5: Enkärnig absorptionskropp, med totalvikten 1 gram, tillverkad av ett delvis neutraliserat superabsorberande material, med pH = 4,2, enligt uppfinningen samt en kemitermomekanisk cellulosamassa med pH = 6,7, i förhållande 15/85 vikt-%.

Testprodukt 6: Tvåkärnig absorptionskropp. Överkärnan (ök), med totalvikten 1,3 gram, tillverkad av ett delvis neutraliserat superabsorberande material, med pH = 4,6, enligt uppfinningen samt en kemitermomekanisk massa med pH = 5,8, i förhållande 15/85 %. Underkärnan (uk), med totalvikten 1,2 gram, tillverkad av ett delvis neutraliserat superabsorberande material, med pH = 4,6, enligt

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uppfinningen samt en kemisk massa med pH = 6,3, i  
förhållande 15/85 vikt-%.

## TESTRESULTAT:

5 Exempel 1

Ur Tabell 1 framgår, att det i en enkärnig konventionell absorptionskropp, enligt referensprodukt 1, föreligger god tillväxt av mikroorganismer. Mätningen genomfördes enligt Metod 4.

10

Tabell 1:

TID	Esherichia coli	Proteus mirabilis	Enterococcus faecalis
0 tim	3,3	3,1	3,7
6 tim	7,0	6,4	7,1
12 tim	9,2	9,1	8,3

15 Exempel 2

Ur Tabell 2 framgår, att det i en enkärnig absorptionskropp, enligt testprodukt 1, föreligger god hämning av tillväxten av mikroorganismer. Mätningen genomfördes enligt Metod 4.

20

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Tabell 2:

Tid	Esherichia coli	Proteus mirabilis	Enterococcus faecalis
0 tim	3,2	3,3	3,4
6 tim	5,5	3,2	4,8
12 tim	7,3	4,0	6,1

Exempel 3

5

Ur Tabell 3 framgår, att det i en enkärnig absorptionskropp enligt testprodukt 2, föreligger god hämning av tillväxten av mikroorganismer. Mätningen genomfördes enligt Metod 4.

10 Tabell 3:

tid	Esherichia coli	Proteus mirabilis	Enterococcus faecalis
0 tim	3,4	3,3	3,5
6 tim	3,2	2,6	3,6
12 tim	2,8	2,0	3,5

Exempel 4

15

Ur Tabell 4 framgår, att det i en tvåkärnig konventionell absorptionskropp, enligt referensprodukt 2, föreligger god tillväxt av mikroorganismer. Mätningen genomfördes enligt Metod 4.

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Tabell 4:

Tid	Esherichia coli		Proteus mirabilis		Enterococcus faecalis	
	ök*	uk**	ök*	uk**	ök*	uk**
0 tim	3,4	3,4	3,4	3,4	3,4	3,4
6 tim	6,8	7,0	6,6	6,7	6,7	6,2
12 tim	9,0	9,0	9,1	9,0	8,0	7,8

\*ök = övre kärna, \*\*uk = undre kärna

5

Exempel 5

Ur Tabell 5 framgår, att det i en tvåkärnig absorptionskropp enligt testprodukt 3, föreligger god hämning av tillväxten av mikroorganismer. Mätningen genomfördes enligt Metod 4.

10

Tabell 5:

Tid	Esherichia coli		Proteus mirabilis		Enterococcus faecalis	
	ök*	uk**	ök*	uk**	ök*	uk**
0 tim	3,4	3,4	3,4	3,4	3,4	3,4
6 tim	5,1	5,6	3,3	4,2	4,4	4,5
12 tim	7,3	7,4	4,0	4,0	5,9	4,8

15

\*ök = övre kärna, \*\*uk = undre kärna

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### Exempel 6

Ur Fig 9 framgår att effektiv fördröjning av utvecklingen av ammoniak erhålls i en enkärnig absorptionskropp, enligt testprodukt 5, jämfört med en enkärnig konventionell absorptionskropp, enligt Referensprodukt 4. Mätningen genomfördes enligt Metod 5.

### Exempel 7

Ur Fig 10 framgår att hudens yt-pH efter en tids användning av en provprodukt innehållande en absorptionskropp, testprodukt 4, etablerar sig på en lägre nivå än efter användning av en motsvarande provprodukt innehållande ett konventionellt superabsorberande material, enligt Referensprodukt 3, efter tillsatts av Testvätska 3. Mätningen genomfördes enligt Metod 6.

### Exempel 8

Ur Tabell 6 framgår att uppmätt pH i en enkärnig absorptionskropp, testprodukt 1, efter tillsats av testvätska, ligger inom det verksamma pH intervallet 3,5-4,9. Mätningen genomfördes enligt Metod 3.

Tabell 6:

	Testvätska 1	Testvätska 2	Testvätska 3
pH	4,29	4,42	4,54

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Exempel 9

Ur Tabell 7 framgår att uppmätt pH i en tvåkärnig absorptionskropp, testprodukt 6, efter tillsats av testvätska, ligger inom det verksamma pH-intervallet 3,5-4,9.

- 5 Mätningen genomfördes enligt Metod 3.

Tabell 7:

	Testvätska 1	Testvätska 2	Testvätska 3
pH ök*	4,72	4,83	4,80
pH uk**	4,75	4,73	4,73

- 10 \*ök = övre kärna, \*\*uk = undre kärna

Ett lägre pH visar alltså goda effekter avseende hämning av tillväxt av mikro-organismer. Då delvis neutraliserad superabsorbent används tillsammans med det  
15 materiallaminat som beskrivits ovan i ett absorberande alster, erhålles ytterligare fördelar avseende hudirritationer och lukt. Det beskrivna materiallaminatet ger en torrare yta mot huden vid användning, vilket även det har en god effekt på hudirritationer. Dessutom har svetsmönstret i materiallaminatet i alstret enligt  
uppfinningen, en tredimensionell struktur, vilket syns tydligt i t ex Fig 2. Detta  
20 innebär att det är mindre material som ligger an direkt mot användarens hud, vilket medför att det vid användning av ett alster med ett sådant ytmaterial inte blir så tätt mellan ytmaterial och användarens hud. Därmed minskar risken för hudirritationer, t ex genom skavning och/eller genom att huden blir fuktig, p g a instängdhet (värme) och/eller genom att en viss mängd vätska efter en första vätning förblir kvar i  
25 ytskiktet som ligger an mot användarens hud.

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Nedan följer nu ytterligare utföringsformer av materiallaminatet 1 som används i uppfinningen. Fig 3 visar ett bindningsmönster för ett materiallaminat 1 som översta skikt riktat mot användaren i ett absorberande alster enligt uppfinningen. Bindningsmönstret består av rombiska bindningsställena 4 anordnade i grupper 5' om fyra bindningsställena 4 i varje grupp 5'. Vidare uppvisar bindningsmönstret i Fig 3 överordnade gruppbildningar 5'' om fyra grupper 5' med vardera fyra bindningsställena 4. I bindningsmönstret i Fig 3 kan således identifieras tre olika typer av områden 6,7,9 med inbördes olika materialtäthet. Den tätaste materialstrukturen, med minst porstorlek återfinns därvid inom grupperna 5' bestående av fyra bindningsställena 4. Områden 7 med något mindre täthet och därigenom något större porstorlek återfinns i de överordnade gruppbildningarna 5'' av grupper 5' med vardera fyra bindningsställena 4. De minst täta områdena 9, slutligen, återfinns mellan de överordnade gruppbildningarna 5'', och mellan de överordnade gruppbildningarna 5'' och enstaka grupper 5 av bindningsställena 4, vilka är anordnade mellan de överordnade gruppbildningarna 5''.

Fig 4 visar bindningsställena 4 i form av korta (1-1,5mm) streck-formade bindningar anordnade i huvudsakligen parallella stråk 5 med ett inbördes avstånd mellan stråken som överstiger avståndet mellan de i stråken ingående bindningsställena 4. Inom stråken föreligger förtätade områden 6 mellan bindningsställena 4, uppvisande mindre porstorlek än områden 7, belägna mellan stråken 5.

Ytterligare användbara bindningsmönster visas i figurerna 5-7, varvid Fig 5 visar huvudsakligen parallella, vågiga bindningslinjer 4 anordnade parvis med ett inbördes avstånd mellan bindningslinjerna 4 i varje par 5 som överstiger avståndet mellan paren 5 av bindningslinjer 4. Således erhålls med det i Fig 5 visade bindningsmönstret ett materiallaminat med förtätade vätskeöverföringsområden mellan bindningslinjerna 4 i varje par och bulkiga, distansskapande, mjuka och luftiga områden 7 mellan bindningsparen 5.

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En fördel med att ordna bindningsställena 4 i form av stråk, eller linjer, är att ett ytmaterial med ett sådant bindningsmönster huvudsakligen leder vätska i utmed stråken, eller linjerna och motverkar vätskespridning vinkelrätt mot stråken eller linjerna. Detta förhållande kan med fördel utnyttjas för att minska risken för kant-  
5 läckage för ett absorberande alster.

Fig 6 visar ett mönster med grupper 5 vardera bestående av två bindningsställena 4 i form av koncentrisk ringar, vilka avgränsar förtätade områden 6, medan områden 7 med mindre täthet återfinns utanför det yttre av det ringformiga bindningsställena 4.

Fig 7 visar ett mönster av korta parallella bindningsstreck 4 anordnade parvis på ett inbördes avstånd så att det bildas förtätade områden 6 mellan bindingsstrecken 4 i varje par 5 och mindre täta områden mellan paren av bindningsstreck 4.

I Fig 8 visas ett inkontinensskydd 10 som en utföringsform av ett absorberande alster enligt uppfinningen, vilket innefattar ett materiallaminat 1 som omfattar ett vätskegenomsläppligt ytskikt 2, samt ett vätskegenomsläppligt vätskeöverförings-  
15 skikt 3. Det vätskegenomsläppliga ytskiktet 2 innesluter tillsammans med ett vätsketätt bottenskikt 11 en absorptionskropp 12. Ytskiktet 2 och bottenskiktet 11 har  
20 något större utsträckning i planet än absorptionskroppen 12 och sträcker sig ett stycke utanför absorptionskroppens kanter. Ytskiktet 2 och bottenskiktet 11 är inbördes förbundna inom de utskjutande partierna 13, exempelvis genom limning eller svetsning med värme eller ultraljud.

Absorptionskroppen 12 kan vara av vilket som helst konventionellt slag. Exempel på  
25 vanligen förekommande absorptionsmaterial är cellulosafloffmassa, tissueskikt, högabsorberande polymerer (s k superabsorbent), absorberande skummaterial, absorberande nonwoven-material och liknande. Det är även vanligt med absorptionskroppar uppbyggda av skikt av olika material med olika egenskaper vad  
30 gäller vätskemottagningsförmåga, spridningsförmåga och lagringsförmåga. Detta är välkänt för fackmannen inom området och behöver därför inte beskrivas i detalj. De

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- tunna absorptionskroppar som idag är vanliga i exempelvis barnblöjor och inkontinensskydd består ofta av en komprimerad, blandad eller skiktad struktur av cellulosafloffmassa och superabsorbent. Enligt uppfinningen kombineras absorptionsmaterialet med delvis neutraliserad superabsorbent i en absorptions-
- 5 kropp. Detta leder, som nämnts tidigare, till ett absorberande alster med ett lägre pH mot huden vid användning, samt en torr yta mot huden. Hudirritationer och lukt motverkas, genom flera faktorer, såsom hämmad tillväxt av mikroorganismer, mindre skavning mot huden och mindre fukt mot huden.
- 10 Inkontinensskyddet 10 är timglasformat med bredare ändpartier 15, 16 och ett smalare grenparti 17 beläget mellan ändpartierna 15, 16. Grenpartiet 17 är det parti av inkontinensskyddet som är avsett att under användning vara anbragt i användarens gren och tjäna som mottagningsyta för den utsöndrade kroppsvätskan.
- 15 Mellan det vätskegenomsläppliga ytskiktet 2 och absorptionskroppen 11 är, såsom tidigare omtalats, anordnat ett poröst och spänstigt vätskeöverföringsskikt 3, exempelvis en fibervadd, ett poröst skumskikt, eller något annat av de material som angivits som lämpliga för det andra materialskiktet i det i figurerna 1 och 2 visade materiallaminatet. Vätskeöverföringsskiktet 3 tar emot den vätska som passerar
- 20 genom ytskiktet 2. Vid urinering rör det sig ofta om förhållandevis stora mängder vätska som avges under kort tid. Det är därför väsentligt att kontakten mellan det vätskegenomsläppliga ytskiktet och det innanförliggande vätskeöverföringsskiktet 3 är sådan att vätskan snabbt tränger in i vätskeöverföringsskiktet 3. Genom att vätskeöverföringsskiktet är ett skikt med hög bulk och en tjocklek som företrädesvis
- 25 är från 0,5- 4 mm, kan skiktet 3 fungera som en tillfällig reservoar för vätskan innan den efter hand absorberas in i absorptionskroppen 11.
- I det visade exemplet är vätskeöverföringsskiktet 3 något smalare än absorptionskroppen 11, men sträcker sig i hela inkontinensskyddets längd. Ett sådant utförande
- 30 är fördelaktigt eftersom det medger en viss materialbesparing. Det är naturligtvis möjligt att spara ytterligare material genom att inte låta vätskeöverföringsskiktet 3

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sträcka sig i hela inkontinensskyddets längd. Exempelvis är det tänkbart att endast anordna vätskeöverföringsskiktet 3 vid inkontinensskyddets grenparti 17, eftersom huvudparten av den kroppsvätska som skall absorberas av inkontinensskyddet kan förväntas träffa skyddet inom detta parti 17.

5

Vanligen använda vätskeöverföringsskikt är ofta mycket porösa och uppvisar därmed en relativt stor effektiv medelstorlek vilken ofta är större än den effektiva medelporstorleken hos konventionella vätskegenomsläppliga ytskiktmaterial. Det effektiva medelporstorleken hos ett fibermaterial kan mätas enligt en mätmetod som beskrivs i EP-A-0 470 392. Eftersom vätska av kapillärverkan strävar efter att gå från grövre till finare kapillärer och ej tvärtom, tenderar vätska att stanna kvar i ytmaterialets fibernätverk istället för att dräneras av det porösare vätskeöverföringsskiktet. Detta innebär att vätska riskerar att rinna på ytskiktets yta och ge upphov till läckage. Dessutom stannar vätska kvar i ytskiktets fiberstruktur, varigenom ytskiktets yta upplevs som våt och obehaglig av användaren.

10

15

Genom att förbinda det vätskegenomsläppliga ytskiktet 2 med vätskeöverföringsskiktet 3, såsom beskrivits i samband med det i Fig 1 och 2 visas materiallaminatet 1, erhålls en komprimering av vätskeöverföringsskiktet 3 vid bindningsställena 4.

20

Vätskeöverföringsskiktet 3 uppvisar därigenom en densitetsgradient med ökande densitet in mot respektive bindningställe 4. Vätskeöverföringsskiktet 3 kommer härmed att uppvisa en porstorleksgradient kring bindningsställena 4 och ett område där den effektiva medelporstorleken är mindre än det vätskegenomsläppliga ytskiktets 2 medelporstorlek. Genom att gruppera bindningsställena 4 i enlighet med uppfinningen, är det möjligt att öka den del av materiallaminatets 1 yta vid vilken medelporstorleken för vätskeöverföringsskiktet 3 är mindre än medelporstorleken för det vätskegenomsläppliga ytskiktet 2.

25

Vätskeöverföringsskiktet 3 kan härigenom effektivt dränera ytskiktet 2 på vätska.

30

Genom att ytskiktet 2 dräneras på vätska i området kring respektive bindningsställe 4 och i de mellanliggande, tätare områdena 6 mellan bindningsställena 4 i varje

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grupp 5 av bindningsställena, uppstår i dessa områden ett underskott på vätska, varvid en vätskeutjämning kommer att ske med omkringliggande områden. Ytskiktet 2 kommer därmed totalt att innehålla mindre vätska och därigenom upplevas som torrare mot huden. Eftersom dessutom ett lägre pH erhålles vid användning av alstret, genom att ett delvis neutraliserat superabsorberande material ingår i absorptionskroppen, minskar risken för t ex hudirritationer väsentligt.

Genom att arrangera bindningsställena 4 i grupper 5 med bindningsfria, förtätade områden 6 mellan bindningsställena 4, är det således möjligt att med ett förhållandevis litet antal bindningar erhålla mycket god vätsketransport från det vätskegenomsläppliga ytskiktet 2 till vätskeöverföringsskiktet 3. Vidare lämnas bindningsfria områden 7 mellan grupperna 5, vilket ger inkontinensskyddets 10 mot användaren vända yta en vågig struktur. Dessutom är de bindningsfria områdena 7 mellan bindningsgrupperna 5 bulkiga och mjuka och medför att materiallamina- 15 tet blir luftigt och komfortabelt, samt ger god distansverkan varigenom huden kan hållas torr även efter användning.

För att erhålla god vätskeöverföring mellan vätskeöverföringsskiktet 3 och absorptionskroppen 11, bör absorptionskroppen ha större vätskeaffinitet än vätske- 20 överföringsskiktet 3. Detta kan exempelvis åstadkommas genom att vätskeöverföringsskiktet 3 är mindre hydrofilt än absorptionskroppen 11 och/eller genom att absorptionskroppen 11 har en mer finkapillär struktur än vätskeöverföringsskiktet 3.

Uppfinningen skall inte anses vara begränsad till de här beskrivna utförings- 25 exemplen, utan en rad ytterligare varianter och modifikationer är tänkbara inom ramen för de efterföljande patentkraven.

Med uttrycket "innefattande" menar vi inkluderande men ej begränsande till.

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Patentkrav

1. Absorberande alster, såsom blöjor, bindor, inkontinensskydd, förband eller liknande, innefattande en absorptionskropp (12) innesluten mellan ett vätsketätt  
5 bottenskikt (11) och ett materiallaminat (1) i form av ett vätskegenomsläppligt fibröst materialskikt (2) som ytskikt (2), och ett vätskegenomsläppligt, poröst och spänstigt materialskikt (3) som vätskeöverföringsskikt (3) varvid vätske-  
överföringsskiktet (3) är vänt mot absorptionskroppen (12), där materiallaminatet (1) har en planutsträckning och en tjockleksled vinkelrätt mot planutsträckningen,  
10 varvid åtminstone ett av materialskikten (2,3) innefattar termoplastiskt material och de båda materialskikten (2,3) är inbördes förbundna genom att materiallaminatet (1) uppvisar bindningsställena (4) inom vilka det termoplastiska materialet bringats att åtminstone delvis mjukna eller smälta och därigenom  
sammanbinda de båda materialskikten (2,3), kännetecknat av att  
15 absorptionskroppen innefattar delvis neutraliserad superabsorbent och att materiallaminatets sammanbindningsområden sträcker sig i materiallaminatets (1) tjockleksled genom ytskiktet (2) och åtminstone genom en del av vätske-  
överföringsskiktet (3).
- 20 2. Absorberande alster enligt krav 1, kännetecknat av att materiallaminatets (1) bindningsområden är anordnade i två eller flera grupper (5) med minst två bindningsställena (4) i varje grupp (5), varvid det största inbördes avståndet mellan två invid varandra belägna bindningsställena (4) i en viss grupp (5) är mindre än  
det minsta avståndet mellan gruppen (5) och dess närmast belägna granngrupp  
25 (5), varigenom materiallaminatet (1) uppvisar bindningsfria områden (6) mellan bindningsställena (4) inom varje bindningsgrupp (5) vilka har högre densitet än bindningsfria områden (9) av materiallaminatet vilka är belägna mellan bindningsgrupperna (5).

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3. Absorberande alster enligt krav 1 eller 2, **kännetecknat** av att superabsorbenten uppvisar sådan neutralisationsgrad att pH i alstrets absorptionskropp efter vätning, är i intervallet 3,5 - 4,9, företrädesvis 4,1 - 4,7.
- 5 4. Absorberande alster enligt krav 2 eller 3, **kännetecknat** av att materiallaminatets bindningsställena (4) innefattar punktbindningar, bindningslinjer, rektangulära bindningar eller cirkulära bindningar.
- 10 5. Absorberande alster enligt något av föregående krav, **kännetecknat** av att ytskiktet (2) uppvisar genomgående hål inom bindningsställena (4).
6. Absorberande alster enligt något av föregående krav, **kännetecknat** av ytskiktet (2) utgörs av ett nonwoven-material.
- 15 7. Absorberande alster enligt något av föregående krav, **kännetecknat** av ett nonwoven-material är ett kardat, termobundet material.
8. Absorberande alster enligt något av föregående krav, **kännetecknat** av att vätskeöverföringsskiktet (3) är ett fibervaddskikt med en tjocklek av 0,5-4 mm.
- 20 9. Absorberande alster enligt något av föregående krav, **kännetecknat** av att det minsta inbördes avståndet  $x$  mellan två invid varandra belägna grupper (5) av bindningsställena (4) är åtminstone dubbelt så stort som det största avståndet  $y$  mellan två invid varandra anordnade bindningsställena (4) inom grupperna (5).
- 25 10. Absorberande alster enligt krav 9, **kännetecknat** av att förhållandet  $x/y$ , mellan avstånden  $x$  och  $y$ , är från 2/1 till 12/1.
- 30 11. Absorberande alster enligt krav 9 eller 10, **kännetecknat** av att  $x$  är 2-6 mm och  $y$  är 0,5-1 mm.

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Sammandrag

5 Absorberande alster, såsom blöjor, bindor, inkontinensskydd, förband eller liknande, innefattande en absorptionskropp 12 innesluten mellan ett vätsketätt bottenskikt 11 och ett materiallaminat 1 i form av ett vätskegenomsläppligt ytskikt 2 och ett vätskegenomsläppligt vätskeöverföringsskikt 3, med vätskeöverföringsskiktet 3 vänt mot absorptionskroppen 12, där det vätskegenomsläppliga ytskiktet 2 och vätskeöverföringsskiktet 3 är inbördes förbundna med varandra, varvid absorptionskroppen innefattar delvis neutraliserat superabsorberande material.

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# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference <b>52515-58012</b>	<b>FOR FURTHER ACTION</b> <div style="text-align: right; font-size: small;">See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)</div>	
International application No. <b>PCT/SE99/02370</b>	International filing date ( <i>day/month/year</i> ) <b>15/12/1999</b>	Priority date ( <i>day/month/year</i> ) <b>16/12/1998</b>
International Patent Classification (IPC) or national classification and IPC <b>A61L15/46</b>		
Applicant <b>SCA HYGIENE PRODUCTS AB et al.</b>		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.
  
2. This REPORT consists of a total of 5 sheets, including this cover sheet.
 

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:
 

I	<input checked="" type="checkbox"/> Basis of the report
II	<input type="checkbox"/> Priority
III	<input type="checkbox"/> Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
IV	<input type="checkbox"/> Lack of unity of invention
V	<input checked="" type="checkbox"/> Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
VI	<input type="checkbox"/> Certain documents cited
VII	<input type="checkbox"/> Certain defects in the international application
VIII	<input checked="" type="checkbox"/> Certain observations on the international application

Date of submission of the demand  <b>13/07/2000</b>	Date of completion of this report  <b>02.04.2001</b>
Name and mailing address of the international preliminary examining authority:  <div style="display: flex; align-items: center;"> <div>             European Patent Office              D-80298 Munich              Tel. +49 89 2399 - 0 Tx: 523656 epmu d              Fax: +49 89 2399 - 4465           </div> </div>	Authorized officer  <b>Staber, B</b>  Telephone No. +49 89 2399 8587



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# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/SE99/02370

## I. Basis of the report

1. With regard to the elements of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

### Description, pages:

1-34 as originally filed

### Claims, No.:

1-11 as received on 13/02/2001 with letter of 13/02/2001

### Drawings, sheets:

1/5-5/5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

These elements were available or furnished to this Authority in the following language: , which is:

- ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
- ☐ the language of publication of the international application (under Rule 48.3(b)).
- ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

- ☐ contained in the international application in written form.
- ☐ filed together with the international application in computer readable form.
- ☐ furnished subsequently to this Authority in written form.
- ☐ furnished subsequently to this Authority in computer readable form.
- ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
- ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

- ☐ the description, pages:
- ☐ the claims, Nos.:

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**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/SE99/02370

☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes:	Claims	1-11
	No:	Claims	
Inventive step (IS)	Yes:	Claims	1-11
	No:	Claims	
Industrial applicability (IA)	Yes:	Claims	1-11
	No:	Claims	

2. Citations and explanations  
**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

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## **Section V**

The following documents are referred to:

D1: SE-A-97002298-2

D2: DE-A1-19512005

### **1. Novelty**

The absorbent article according to the present application is considered to be novel over the documents cited in the International Search Report since none of these documents relates to such an article wherein a laminate top sheet is specifically designed with regard to sheet-joining regions of the laminate and wherein the absorbent body is represented by a partially neutralized superabsorbent.

Hence, claims 1 to 11 appear to be novel in the sense of Article 33(2) PCT.

### **2. Inventive Step**

The present invention provides an absorbent article which reduces the risk of skin irritation. This improvement is achieved by two different means, namely

- (1) by incorporating a partially neutralized superabsorbent material into the absorbent body of the article, and
- (2) by using a top sheet in the form of a laminate whose individual layers are thermally bonded in a specific way at discrete regions.

The use of a partially neutralized superabsorbent material in absorbent articles and its advantageous effects on reducing skin irritations and bad odours is already known from the Swedish application SE 9702292.2 (D1). Thus, the presence of a partially neutralized absorbent material does not impart an inventive merit to the invention.

Document DE-A-195 12 005 (D2) deals with an absorbent article comprising a laminate top sheet composed of a two different layers of a web material (fleece) which are welded to a stiffened carrier layer enveloping absorbing particles. During welding, a

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punctiform bonding (6) is created. According to Figure 1 of D2, the sheet-joining region (6) extends through both layers of the web (fleece)material.

However, contrary to the present invention, it is not the laminate structure which contacts the skin or the wound, but the elastic carrier layer forming a highly absorbent system. The laminate structure of D1 is of an inelastic material creating a certain mechanical force to the wound (cf. cf D1, col.3, l.14-20) while the laminate structure of the invention is characterized by a high liquid transfer capacity.

The purpose of the laminate used in D1 is therefore completely different from that of the invention. The present invention is therefore not obvious in the light of D1 and/or D2.

Consequently, claims 1 to 11 fulfil the requirements of Art. 33(3) PCT.

### **Section VIII: Clarity**

Claim 1 does not fulfil the requirements of Article 6 PCT since the individual layers (2) and (3) of the top sheet are not clearly distinguishable from each other. Both layers are liquid permeable, porous, resilient (the fibres of (2) render this layer porous and resilient) and includes thermoplastic material.

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## CLAIMS

1. An absorbent article, such as a diaper, sanitary napkin, incontinence  
5 protector, wound dressing or the like, comprising an absorbent body (12) enclosed  
between a liquid-impermeable backing sheet (11) and a material laminate (1) in the  
form of a liquid permeable, fibrous sheet of material (2) forming a top sheet (2), and a  
liquid-permeable, porous and resilient sheet of material (3), forming a liquid transfer  
sheet (3) lying proximal to the absorbent body (12), wherein the laminate (1) has a  
10 planar extension and a thickness direction perpendicular to said planar extension,  
wherein at least one of the sheets (2, 3) includes thermoplastic material, and wherein  
the two sheets (2, 3) are joined together through the medium of bonding locations (4)  
on the laminate (1) within which the thermoplastic material is caused to at least  
partially soften or melt and thereby join together said two sheets (2, 3), characterised  
15 in that the absorbent body includes partially neutralised superabsorbent; and in that the  
sheet-joining regions of the laminate extend in the thickness direction of said laminate  
(1) through the top sheet (2) and at least partially through the liquid transfer sheet (3).

2. An absorbent article according to Claim 1, characterised in that the  
20 laminate bonding regions are disposed in two or more groups (5) where each group  
includes at least two bonding locations (4), wherein the largest relative distance  
between two mutually adjacent bonding locations (4) in a given group (5) is smaller  
than the smallest distance between a group (5) and its nearest neighbouring group (5),  
wherein the laminate (1) includes between the bonding locations (4) in each bonding  
25 group (5) first non-bonded laminate regions (6) that have a greater density than second  
non-bonded laminate regions (9) located between respective bonding groups (5).

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3. An absorbent article according to Claim 1 or 2, characterised in that the superabsorbent has a degree of neutralisation such that the pH in the absorbent body of the article when wetted will lie in the range of 3.5-4.9, preferably 4.1-4.7.

5

4. An absorbent article according to Claim 2 or 3, characterised in that the laminate bonding locations (4) include punctiform bonds, linear bonds, rectangular bonds or circular bonds.

10 5. An absorbent article according to any one of the preceding Claims, characterised in that the top sheet (2) has through-penetrating holes within the bonding locations (4).

15 6. An absorbent article according to any one of the preceding Claims, characterised in that the top sheet (2) is comprised of a nonwoven material.

7. An absorbent article according to any one of the preceding Claims, characterised in that the top sheet (2) is comprised of a carded, thermobonded nonwoven material.

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8. An absorbent article according to any one of the preceding Claims, characterised in that the liquid transfer sheet (3) is a fibre wadding sheet having a thickness of 0.5-4 mm.

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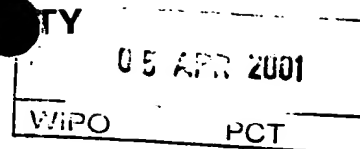
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9. An absorbent article according to any one of the preceding Claims, characterised in that the smallest distance  $x$  between two mutually adjacent groups (5) of bonding locations (4) is at least twice the size of the greatest distance  $y$  between
- 5 two mutually adjacent bonding locations (4) in respective groups (5).
10. An absorbent article according to Claim 9, characterised in that the ratio of  $x/y$  between the distances  $x$  and  $y$  is from 2/1 to 12/1.
- 10 11. An absorbent article according to Claim 9 or 10, characterised in that  $x$  is 2-6 mm and  $y$  is 0.5-1 mm.

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## INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

14

Applicant's or agent's file reference 52515-58012	<b>FOR FURTHER ACTION</b> See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/SE99/02370	International filing date (day/month/year) 15/12/1999	Priority date (day/month/year) 16/12/1998
International Patent Classification (IPC) or national classification and IPC A61L15/46		
Applicant SCA HYGIENE PRODUCTS AB et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.



2. This REPORT consists of a total of 5 sheets, including this cover sheet.

☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

These annexes consist of a total of 3 sheets.

3. This report contains indications relating to the following items:

- I ☒ Basis of the report
- II ☐ Priority
- III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- IV ☐ Lack of unity of invention
- V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- VI ☐ Certain documents cited
- VII ☐ Certain defects in the international application
- VIII ☒ Certain observations on the international application

Date of submission of the demand  13/07/2000	Date of completion of this report  02.04.2001
Name and mailing address of the international preliminary examining authority:   European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer  Staber, B  Telephone No. +49 89 2399 8587 

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# INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/SE99/02370

## I. Basis of this report

1. With regard to the **elements** of the international application (*Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17)*):

### Description, pages:

1-34 as originally filed

### Claims, No.:

1-11 as received on 13/02/2001 with letter of 13/02/2001

### Drawings, sheets:

1/5-5/5 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

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- ☐ the claims, Nos.:

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**INTERNATIONAL PRELIMINARY  
EXAMINATION REPORT**

International application No. PCT/SE99/02370

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*(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)*

6. Additional observations, if necessary:

**V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

**1. Statement**

Novelty (N)	Yes: Claims 1-11
	No: Claims

Inventive step (IS)	Yes: Claims 1-11
	No: Claims

Industrial applicability (IA)	Yes: Claims 1-11
	No: Claims

- 2. Citations and explanations**  
**see separate sheet**

**VIII. Certain observations on the international application**

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:  
**see separate sheet**

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## **Section V**

The following documents are referred to:

D1: SE-A-97002298-2

D2: DE-A1-19512005

### **1. Novelty**

The absorbent article according to the present application is considered to be novel over the documents cited in the International Search Report since none of these documents relates to such an article wherein a laminate top sheet is specifically designed with regard to sheet-joining regions of the laminate and wherein the absorbent body is represented by a partially neutralized superabsorbent.

Hence, claims 1 to 11 appear to be novel in the sense of Article 33(2) PCT.

### **2. Inventive Step**

The present invention provides an absorbent article which reduces the risk of skin irritation. This improvement is achieved by two different means, namely  
(1) by incorporating a partially neutralized superabsorbent material into the absorbent body of the article, and  
(2) by using a top sheet in the form of a laminate whose individual layers are thermally bonded in a specific way at discrete regions.

The use of a partially neutralized superabsorbent material in absorbent articles and its advantageous effects on reducing skin irritations and bad odours is already known from the Swedish application SE 9702292.2 (D1). Thus, the presence of a partially neutralized absorbent material does not impart an inventive merit to the invention.

Document DE-A-195 12 005 (D2) deals with an absorbent article comprising a laminate top sheet composed of a two different layers of a web material (fleece) which are welded to a stiffened carrier layer enveloping absorbing particles. During welding, a

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punctiform bonding (6) is created. According to Figure 1 of D2, the sheet-joining region (6) extends through both layers of the web (fleece)material.

However, contrary to the present invention, it is not the laminate structure which contacts the skin or the wound, but the elastic carrier layer forming a highly absorbent system. The laminate structure of D1 is of an inelastic material creating a certain mechanical force to the wound (cf. cf D1, col.3, l.14-20) while the laminate structure of the invention is characterized by a high liquid transfer capacity.

The purpose of the laminate used in D1 is therefore completely different from that of the invention. The present invention is therefore not obvious in the light of D1 and/or D2.

Consequently, claims 1 to 11 fulfil the requirements of Art. 33(3) PCT.

#### **Section VIII: Clarity**

Claim 1 does not fulfil the requirements of Article 6 PCT since the individual layers (2) and (3) of the top sheet are not clearly distinguishable from each other. Both layers are liquid permeable, porous, resilient (the fibres of (2) render this layer porous and resilient) and includes thermoplastic material.

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## CLAIMS

Pub B1  
5 1. An absorbent article, such as a diaper, sanitary napkin, incontinence protector, wound dressing or the like, comprising an absorbent body (12) enclosed between a liquid-impermeable backing sheet (11) and a material laminate (1) in the form of a liquid permeable, fibrous sheet of material (2) forming a top sheet (2), and a liquid-permeable, porous and resilient sheet of material (3), forming a liquid transfer sheet (3) lying proximal to the absorbent body (12), wherein the laminate (1) has a planar extension and a thickness direction perpendicular to said planar extension, 10 wherein at least one of the sheets (2, 3) includes thermoplastic material, and wherein the two sheets (2, 3) are joined together through the medium of bonding locations (4) on the laminate (1) within which the thermoplastic material is caused to at least partially soften or melt and thereby join together said two sheets (2, 3), characterised 15 in that the absorbent body includes partially neutralised superabsorbent; and in that the sheet-joining regions of the laminate extend in the thickness direction of said laminate (1) through the top sheet (2) and at least partially through the liquid transfer sheet (3).

20 2. An absorbent article according to Claim 1, characterised in that the laminate bonding regions are disposed in two or more groups (5) where each group includes at least two bonding locations (4), wherein the largest relative distance between two mutually adjacent bonding locations (4) in a given group (5) is smaller than the smallest distance between a group (5) and its nearest neighbouring group (5), wherein the laminate (1) includes between the bonding locations (4) in each bonding 25 group (5) first non-bonded laminate regions (6) that have a greater density than second non-bonded laminate regions (9) located between respective bonding groups (5).

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3. An absorbent article according to Claim 1 or 2, characterised in that the superabsorbent has a degree of neutralisation such that the pH in the absorbent body of the article when wetted will lie in the range of 3.5-4.9, preferably 4.1-4.7.

5  
4. An absorbent article according to Claim 2 or 3, characterised in that the laminate bonding locations (4) include punctiform bonds, linear bonds, rectangular bonds or circular bonds.

10 5. An absorbent article according to any one of the preceding Claims, characterised in that the top sheet (2) has through-penetrating holes within the bonding locations (4).

15 6. An absorbent article according to any one of the preceding Claims, characterised in that the top sheet (2) is comprised of a nonwoven material.

7. An absorbent article according to any one of the preceding Claims, characterised in that the top sheet (2) is comprised of a carded, thermobonded nonwoven material.

20 8. An absorbent article according to any one of the preceding Claims, characterised in that the liquid transfer sheet (3) is a fibre wadding sheet having a thickness of 0.5-4 mm.

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9. An absorbent article according to any one of the preceding Claims, characterised in that the smallest distance  $x$  between two mutually adjacent groups (5) of bonding locations (4) is at least twice the size of the greatest distance  $y$  between two mutually adjacent bonding locations (4) in respective groups (5).

10. An absorbent article according to Claim 9, characterised in that the ratio of  $x/y$  between the distances  $x$  and  $y$  is from 2/1 to 12/1.

11. An absorbent article according to Claim 9 or 10, characterised in that  $x$  is 2-6 mm and  $y$  is 0.5-1 mm.

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